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AUTHOR Lunetta, Vincent N.
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ABSTRACT

The potential use of computers to enhance individualized instruction in schools is too often neglected in both preservice and inservice teacher education. This report describes some materials developed and used to introduce teachers to computer applications in support of classroom teaching. The materials include some interactive computer-based modules currently in use at the University of Iowa. Included are descriptions and information on: (1) staff requirements for implementation, (2) computer modules currently in use, (3) a sample unit outline and bibliography for the system, (4) sample program runs for selected topics included in the computer-based teaching system, and (5) the computer program listings for the system--written in BASIC for Hewlett Packard 2000F computers with the Interactive Dialog Facility (IDF). A paper on the subject of computer usage in teaching at the elementary and secondary level that may be used for both preservice and inservice training is also provided. (DGC)

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technical report 5

**Computer in the Classroom
A Computer-Based Unit
in Teacher Education**

by

Vincent N. Lunetta

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Robert E. Yager, Coordinator
Science Education Center
University of Iowa

Vincent N. Lunetta
Assistant Professor
Science Education Center
University of Iowa
Iowa City, Iowa 52242

COMPUTER IN THE CLASSROOM
A COMPUTER-BASED UNIT IN TEACHER EDUCATION

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On the Need for an Introduction
to Computer Applications

Computers are already being used in a variety of administrative and instructional programs in school systems across the United States. Many schools now have the opportunity to participate in large time-sharing systems or to purchase mini-computers for their own use. All too often, however, significant decisions relating to the use of computers in education are being made by persons who have inadequate understanding of the potential and limitations of computers in an educational environment. Contemporary teachers and administrators frequently deal with issues of computer use primarily through encounters with aggressive computer time-sharing salesmen. Thus, when computers are available in schools, they are quite often misused,¹ their educational potential is not optimized by teachers who are locked into traditional teaching styles by lack of perception, experience, and training.

Computers do have the potential to provide significant and effective support to teachers who are working to develop effective individualized instruction.² To facilitate the development of that potential, however, teachers need to have a viable perception of the role of the computer in support of instruction; they should be familiar with the potential and limitations of computers in education. In calling for inservice teacher education on instructional computing, Murray Tondow writes that "all staff and faculty should have an opportunity to understand more about computers."³ This Report describes some materials developed and used by the author to introduce preservice and inservice teachers to computer applications in support of classroom teaching. The materials include some interactive

computer-based modules currently in use in teacher education at the University of Iowa.

Teachers need to have an understanding of computer applications in education for four primary reasons:

- (1) to make knowledgeable recommendations on questions concerning computer use;
- (2) to modify their teaching style to utilize appropriate computer modules that effectively support classroom learning;
- (3) to actively participate in efforts to design and produce computer software that will be an effective supplement to the curriculum;
- (4) to help students develop skills for the effective use of technology in learning and in their subsequent lives.

Computer literacy is important for all students in today's technological culture, and that literacy can be enhanced through two modes of computer use in education. Many teachers already use the computer as an object of instruction. Mathematics and science teachers commonly teach units on information processing and discuss how computers work. "Flow-charting," pictorial representation of a problem-solving process, and symbolic programming languages are introduced to students in a number of high schools today.⁴ In social studies classes the impact of computers and technology on society is commonly an object of study.⁵ A student's ability to participate in such study is certainly enhanced when he has had the first-hand experience of interacting with a computer. That opportunity can be provided when a computer (or computer terminal) is available to students to supplement their classroom instruction.

The computer can also be a vehicle for instruction; it can help

4

teachers in efforts to individualize education.⁶ In addition to systems for instructional management that are commercially available, well-written tutorial, drill and practice, and simulation programs can be an important resource in a school environment. The computer can be a valuable problem-solving tool for students enabling them to work with realistic problems in a variety of disciplines (Figure 1).

Footnotes

1. Oettinger, A. G., Run, Computer, Run., Cambridge, Mass: Harvard University Press, 1969, p. 50.
2. Lunetta, V. N. and Blick, D. J., "Evaluation of a Series of Computer Based Dialogs in Introductory Physics," The Journal of the Assoc. for Educational Data Systems, Winter 1973, pp. 33-42.
3. Tondow, Murray, "Computers" in Annual Edition Readings in Education, Guilford, Conn.: Duschkin Publishing Group, 1973, p. 165.
4. Lunetta, Vincent N. and Durli, O. E. "Computers in the Science Curriculum: Some Concrete Applications in the Physical Sciences." Science Education, Vol. 54, No. 2, April-June 1970, pp. 147-154.
5. See, for example, Northwest Regional Educational Laboratory, The Social Impact of Computers, San Carlos, California: Tecnica Educational Corporation, 1971.
6. Mitzel, Harold E. "Computer Technology: Its Future Role in Basic Education," The Journal of Teacher Education, XXV, No. 2, Summer 1974, pp. 124-129.

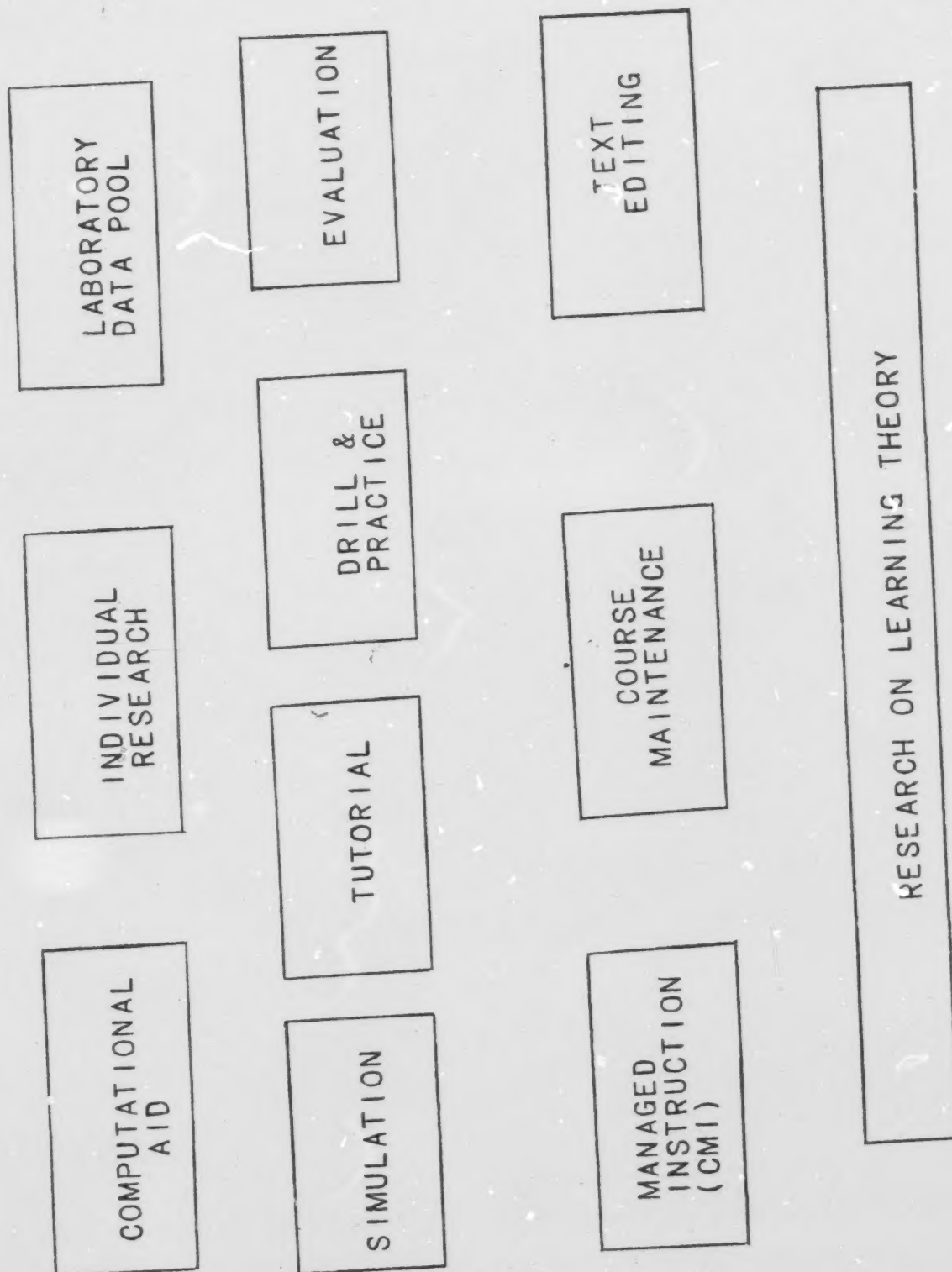


Figure 1. Computer Applications in Education

A Computer-Based Unit

An appropriate and meaningful introduction to computer applications can be provided as a unit included within an introductory course in teacher education. The unit might well be incorporated within a more encompassing topic in instructional design, educational technology, individualized instruction, or methods of teaching.¹ At the University of Iowa, a Computer in the Classroom unit is used by instructors in the following preservice courses: (1) Introduction to Elementary Education, (2) Introduction to Secondary Education, and (3) Methods of Teaching. In the Introduction to Secondary Education course headed by Dean Stuart Gray, the unit has been offered to students as part of a larger unit on individualized instruction. (Student activities in this particular unit are individualized to provide a working model of individualization.)

The next sections of this Report provide a description of the Computer in the Classroom unit. The first of the sections that follow in this chapter discusses instructional staff requirements, the second section describes two of the computer modules currently in use, and the third section reports on module evaluation. Chapter III contains descriptive information including a sample unit outline, instructions for students, and a bibliography for the unit. It can be used as a self-contained "handout" for faculty users. Chapter IV provides a display of sample program runs, and Chapter V provides listings of the interactive programs and files. Chapter VI is a paper on the subject of computer use in elementary and middle schools that is appropriate for preservice and inservice teacher education.

Instructional Staff

For effective implementation of a Computer in the Classroom unit, it is desirable, though not essential, that members of the instructional staff have some first-hand experience with instructional computing. In a college or department where such expertise is not immediately available, instructors with teaching experience in the public schools can teach the unit effectively after personally interacting with a limited number of computer-based modules such as TEACH1 (described in the next section of this paper). An interactive module similar to TEACH1 should be available at computer terminals on campus for staff and student use. The program could be written locally if sufficient faculty expertise and time are available, or it could be imported from an institution already using such a program. Even on campuses where little or nothing has been done with instructional computing, there will be persons who are familiar with both computers and teaching who could serve as consultants or guest lecturers in the development of an introductory unit. Another option is to seek consultant help from a university where effective computer-based programs have already been developed in teacher education.

Computer Modules

The two computer modules forming the core of the Computer in the Classroom unit are listed in Chapter V. Sample program runs are displayed in Chapter IV. The modules were written in Hewlett Packard's Interactive Dialog Facility (IDF) and are running on an HP 2000 F system. The programs were designed for use on video terminals and make use of special display features such as "reverse video". While they may be used on typewriter

terminals, the author believes that slow typewriter speed inhibits module effectiveness.

TEACH1. This module allows users to experience some computer applications illustrating how computers may be used to facilitate learning in several academic areas. The user interacts with the computer through English language messages and numbers, and he needs no special skills for effective program use.

The module includes short drill and practice sequences in elementary arithmetic and in French language translation. A brief English language tutorial from the module is displayed in Figure 1. Figure 2 shows a portion of the sequence on computer graphics. The module also includes two short simulations. One predicts population growth with two user-controlled variables; the second program utilizes a random number generator and was written in support of a high school statistics course. Interspersed throughout the module are parenthetical dialogs discussing the potential and limitations of the particular computer application being utilized. At one point the user is asked: "Can man become a victim of his own technology?" The user's response to this question is followed with further dialog concluding with the question: "Can schools have a role in helping men master technology?"

TEACH4. This conversational dialog discusses the problems of implementation of computer support within a public school environment. It was written initially for inservice teachers, and it provides suggestions that will facilitate effective computer support within school classrooms. In a dialog mode it provides thoughts on teaching styles, individualized instruction, evaluation, assignment options, scheduling computer time,

NOW READ THE WORDS OF RENE DESCARTES AS HE CONTEMPLATED THE COMPUTER:

COGITO ERGO SUM

TRANSLATED: 'I THINK THEREFORE I AM'.

HOW MANY VERBS ARE THERE IN THE ENGLISH TRANSLATION? 3

NO. YOU'D BETTER LOOK AGAIN.

Two

FINE!

TYPE A SENTENCE USING ONE OF THOSE TWO VERBS.

I like to think

O.K. I'LL ACCEPT THAT; YOU DID SPELL 'THINK' PROPERLY.

WHAT IS THE TENSE OF THOSE VERBS? Past

COME ON NOW. THESE VERBS SHOW ACTION NOW. TRY ANOTHER TENSE.

Future

THESE VERBS DON'T DESCRIBE ACTION THAT IS GOING TO HAPPEN.

THE ACTION IS NOW. TRY ANOTHER TENSE.

Present

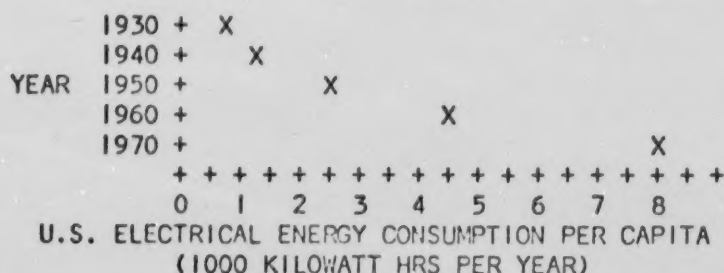
CERTAINLY.

YOU MAY HAVE NOTED THAT THE QUOTATION FROM DESCARTES WAS STATED IN A MISLEADING CONTEXT. IF THE HUMAN AUTHOR PROVIDES INCORRECT INFORMATION, THE TUTORIAL PROGRAM WILL PASS IT ALONG TO STUDENTS. A WRITTEN PROGRAM SHOULD, OF COURSE, BE REVIEWED AND IMPROVED WITH TIME.

Figure 1. Tutorial Extract from TEACHI

(User responses are shown in lower case.)

THE UNDERSTANDING OF GRAPHIC RELATIONSHIPS CAN BE ENHANCED BY COMPUTER DIALOG INVOLVING THE STUDENT IN THE INTERPRETATION OF GRAPHS. HERE IS A SAMPLE GRAPH OF SOME DATA:



READ FROM THE GRAPH THE PER CAPITA CONSUMPTION IN 1945. WHAT VALUE DO YOU ESTIMATE IN KILOWATT HOURS PER YEAR? 1.5
ENERGY UNITS ARE 1000KW-HRS/YEAR. MULTIPLY YOUR ANSWER BY 1000. 1500
O.K. I'LL ACCEPT THAT; I READ APPROXIMATELY 1700.

IF PER CAPITA CONSUMPTION CONTINUES TO GROW AT THE SAME RATE AS IN RECENT DECADES, PREDICT THE VALUE FOR 1980. 16000
BASED ON THE LIMITED DATA SHOWN HERE, THAT'S A REASONABLE PREDICTION.

Figure 2. Graphics Extract from TEACHI

(User responses are underlined.)

planning, staffing, and employment of educational technology. Figure 3 provides a brief excerpt from the conversational dialog.

Module Evaluation

The two computer modules described in the preceding section have been used in teacher education at the University of Iowa for three semesters. The modules were revised after careful analysis of data stored in the user response file, after observations of students using the programs, and after interviewing some of the student users. Data providing information on the effectiveness of the current versions of the programs have been evaluated with care. The data show that users have enjoyed their experiences with the modules and that their perceptions of computer supported teaching improved during the experience.

At one point near the end of TEACH1 users have to respond to the following prompt:

You've been working with this module for some time now; as author, I'd appreciate any comments you'd care to make regarding it. Please type your comments now.

Figure 4 displays some of the comments extracted from the user response file for this section of the program. Generally these comments have indicated very positive user attitudes toward the module.

The perceptions of users have also been evaluated on quantitative measures. In addition to paper and pencil instruments used with early students, all users of the TEACH1 module pass through two sections providing a quantitative pre and post assessment of student attitude toward computer use. With our students, data for large groups has consistently shown an improvement in attitude significant beyond the .05 level

AS WE MOVE TOWARD MORE EXTENSIVE COMPUTER USE IN TEACHING WE OUGHT TO REASSESS OUR STAFFING PATTERNS TO DETERMINE IF THERE IS A MORE OPTIMAL ARRANGEMENT THAN THE ONE CURRENTLY IN USE. WITH THE HELP OF AIDES AND INTERN TEACHERS A TEACHER WHO HAS DEVELOPED AN EFFECTIVE INDIVIDUALIZED COURSE SHOULD BE ABLE TO WORK WITH LARGER NUMBERS OF STUDENTS IN A QUALITY INSTRUCTIONAL ENVIRONMENT. WITH A "MASTER TEACHER" IN CHARGE OF TEACHING AND DEVELOPMENT IN A COURSE, A SCHOOL WOULD HAVE AN EFFECTIVE VEHICLE FOR TRAINING TEACHERS AND FOR ENCOURAGING QUALITY WITHIN AN INSTRUCTIONAL PROGRAM DESIGNED TO PROVIDE FOR STUDENT DIFFERENCES.

CAN COMPUTERS HAVE A DEHUMANIZING INFLUENCE ON A CLASSROOM ENVIRONMENT?

No, I don't think so.

I DISAGREE!

IN MY OPINION, COMPUTERS LIKE OTHER TECHNOLOGICAL DEVICES CAN BE SERIOUSLY MISUSED BY THE CLASSROOM TEACHER -- ALTHOUGH I DON'T BELIEVE THAT MISUSE IS INEVITABLE. IN THE HANDS OF CONCERNED, SENSITIVE TEACHERS, I BELIEVE THAT SUCH DEVICES CAN ENHANCE THE LEARNING PROCESS. WE SHOULD UTILIZE TECHNOLOGICAL DEVICES TO HELP US MEET MORE EFFECTIVELY THE LEARNING GOALS OF OUR STUDENTS. LET US BE CONCERNED AND SENSITIVE!!

Figure 3. Extract from TEACH4

(User responses are shown in lower case)

The first time through I got a little rattled.

Interesting.

More interesting than usual classwork.

Severe disadvantage to students who have trouble typing like me.

It has been a very interesting experience for me.

Fascinating.

A reasonable introduction to the use of the computer.

This is a very unique and interesting experience. Through the use of this computer module I have gained much experience, has been very worthwhile. Thanks Vince.

Pretty good, considering.

I enjoyed working with the computer.

It is fun, but the computer is smart alecky.

This kind of program seems to be a great way to learn through individual instruction because the computer can do so many things so much faster. It also seems to be a useful tool for drills. As long as the teacher is there for help I would use it as much as necessary without any fear of it becoming a "mechanical" education.

This program was definitely fun and easy to follow. It brought up the strong and also weakness. I did find it tiring on early morning eyes and at first hard to take serious. I imagine that would stop with time.

Great possibilities in math.

I truly enjoyed working with Vince and it was really fun. I have never worked on a computer before. One problem was that I could not understand some of the questions and there was no one to ask about my questions.

You've been great, Vince.

It is very interesting but I wonder if it is not somewhat impersonal.

The only problem I have is the lines make my eyes tired when they jump.

It makes this type of work quite enjoyable, I am impressed.

Nice process to learn about computer assisted instruction.

Did get quite a few laughs out of it. It proved to be very interesting. Thank you.

Enjoyable.

using the t - test for Related Measures or Analysis of Variance - Repeated Measures Design.

While the computer modules have been evaluated and used primarily in a preservice teacher education program, the author has also used them effectively in workshops with inservice teachers.

Footnote

¹ A few contemporary educators believe that students in teacher education should be required to complete one or more computer courses. An introductory course might cover topics including:

1. Information Processing
2. The Digital Computer
3. Programming Languages
4. Computer Applications
5. Computers and Society.

In a course of this sort, students would probably learn the elements of a symbolic programming language and write some simple programs. While such a course should be available as an option to students in teacher education, the author believes that a course of that magnitude need not be required!

Suggestions for Faculty

and

Sample Unit Outline

Suggestions for Faculty

COMPUTER IN THE CLASSROOM

A Computer-Based Unit in Teacher Education
by
Vincent N. Lunetta

This reference has been compiled for faculty members who contemplate a course unit introducing preservice or inservice teachers to classroom applications of the computer. Interactive computer modules supporting such a unit have been completed and are available to students in the College of Education. Other teacher education modules are being developed.

Rationale for a Unit on Computers in the Classroom

Computers are already being used in a variety of administrative and instructional programs in school systems across the country. All too often significant decisions relating to the use of computers in instruction are being made by persons who have very little understanding of the potential and limitations of computers in an educational environment. When computers are available in schools, they are quite often misused; their potential is not adequately optimized.

Computer literacy is important for students in today's technological society. Many teachers already use the computer as an object of instruction; students examine the impact of computers on society. A student's ability to participate in such study is certainly

enhanced when he has had the opportunity to use the computer as an instructional tool.

The computer can help teachers in their efforts to individualize education. Well-written tutorial, drill and practice, and simulation programs can be an important individualized resource in a school environment. The computer can be a valuable problem-solving tool for students enabling them to work with more realistic problems in a variety of disciplines.

An introduction to the potential and limitations of computers in education should be a part of the professional education of teachers. All too often, contemporary teachers first deal with issues of computer use through an encounter with an aggressive computer time-sharing salesman or with a zealous superintendent of schools. Teachers should have an understanding of computer applications in education so they will be able to make knowledgeable recommendations on questions concerning computer use. When a computer is available, teachers should be able to use it for maximum benefit of their students.

Sample Computer Unit Outline

(This unit might well be part of a broader unit on Educational Technology)

Lecture/Discussion: (optional)

- Individualizing Instruction and the Computer
- The Computer and Education
- Functions of a Computer System
- Psychological Foundations of Computer Use
- Drill and Practice; Simulation; Computer Graphics

Assignment #1:

RUN Computer Modules (This experience is the most essential part of the unit.)

TEACH1

A Simulation or Game or Module in your own teaching field (optional)

READ: Selected references on Computers and Education.

(Assignment #1 must be completed prior to small group discussion which follows.)

Small Group Discussion:

Classroom Computer Use

Review Computer Applications in Teaching

Discuss Potential and Limitations of Computer Use

Facilitating Individualized Instruction

Further Assignments: (optional)

1. Further readings
2. Write and produce an appropriate computer module to supplement a course you are teaching or contemplate teaching
3. Write a paper on:
Computer Applications in your own field of specialization
Humanizing the Individualized Classroom
4. View the film: "The Remarkable Schoolhouse"
(Produced by CBS Television Network)
5. Visit a classroom using Project PLAN
6. Visit a classroom using computer materials

Questions for Discussion in Small Group Section Meetings:

1. List and describe at least three uses of the computer in instruction.
2. Explain the purpose of simulation in teaching; describe a good issue or event to simulate.
3. Explain the purpose of Drill and Practice.
4. Can the computer help to individualize instruction? If so, how should it be employed for optimum advantage?
5. Are there serious limitations to computer use in the classroom? What are they?
6. What is meant by "dehumanizing the classroom?" Is it a real problem?
7. How do we make the classroom more human? Can we do these things and still employ computers and other technological devices effectively?
8. What appropriate computer applications do you envision in your own field of teaching. Be specific.

Computer Modules Available for Unit Support

1. TEACH1 - This module allows users to experience some computer applications illustrating how computers may be used to facilitate learning in several academic areas. It includes short simulations, tutorial dialog, and drill and practice.
2. TEACH4 - This conversational dialog discusses the problems of implementations of computer support within a public school environment and provides suggestions to teachers to facilitate effective support.
3. FORCEA, FORCEB, FORCEC, FORCED - These four individualized programs simulate physical experiments in force and motion, graph the unique data collected by individual students, and provide feedback to each student relative to his generalizations. Film loops are available to improve the realism of each simulation. (Technical Report #1, Science Education Center, University of Iowa, Iowa City, Iowa 52242).

Instructions for Registering Students for Computer Module Use.

1. Your students may all be given one demonstration student number and not registered as individuals. Using this method, no records of student usage will be kept.
2. Students may be registered as individuals on the computer system and records of individual progress may be kept. These records will include the length of time each student spends in each program and may include responses to specific items in the programs as requested by the instructor.

For further information in registering your students and acquiring student user numbers please contact the College of Education, CBE coordinator _____ at _____.

Guest Lecturer on Computer Based Education

There are several persons on campus who are familiar with both education and computers who have indicated a willingness to serve as faculty consultants and as guest lecturers. To make arrangements for such visits, contact CBE coordinator _____ at _____.

BIBLIOGRAPHY

Books

American Association of School Administrators. Administrative Technology and the School Executive. Washington, D.C.: Amer. Assoc. of Sch. Adm. 1969.

Anderson, A. E., ed. Minds and Machines. Englewood Cliffs, N. J.: Prentice-Hall, 1964.

Association for Educational Data Systems. Layman's Guide to the Use of Computers. Washington, D.C.: A.E.D.S., 1971.

Bell, Daniel. Toward the Year 2000: Work in Progress. Boston: Houghton Mifflin, 1968.

Borko, H. ed. Computer Applications in the Behavioral Sciences. Englewood Cliffs, N. J.: Prentice-Hall, 1962.

Bronowski, J. The Identity of Man. New York: Natural History Press, Division of Doubleday & Co., Inc., 1964.

Calvin, Allen D. ed. Programmed, Instruction. In Bold New Venture Series, Bloomington, Ind.: Indiana University PRESS, 1969

Chapin, Ned. Flowcharts. Princeton, N.J.: Auerbach Publishers, Inc., 1971.

Charp, Sylvia. Computers in General Education. Harrisburg, Pa. Pennsylvania Department of Public Instruction, 1967.

Conference Board of the Mathematical Sciences, Recommendations Regarding Computers in High School Education, Washington, D.C., Conference Board of the Mathematical Sciences, 1972

Crowley, Thomas H., Understanding Computers, New York, N. Y., McGraw-Hill Book Co., 1967

Darnowski, Vincent S. Computers - Theory and Uses. Washington, D.C.: National Science Teachers Association, 1964.

Edwards, Judith B. Computer Instruction - Planning and Practice. Portland, Ore.: Northwest Regional Educational Laboratory, 1969.

Ellul, Jacques. The Technological Society. New York: Vintage Books, Division of Random House, Inc., 1967.

Books continued

Espich, James E. and Williams, Bill. Developing Programmed Instructional Materials: A Handbook for Program Writers. Palo Alto, Calif.: Fearon Publishers, 1967

Feigenbaum, E. A. ed. Computers and Thought. New York: McGraw-Hill Book Co., 1963.

Gerard, E. ed. Computers and Education. New York: McGraw-Hill Book Co., 1967.

Goodman, L. L. Man and Automation. New York: Penguin Books, Inc., 1957.

Greenberger, Martin. ed. Computers and the World of the Future. Cambridge, Mass.: M.I.T. Press, 1962.

Gruenberger, Fred. Problems for Computer Solution. New York: John Wiley and Sons, Inc., 1965.

Jacobs, Paul I., Maier, Milton H. and Stolurow, Lawrence M. A Guide to Evaluating Self-Instructional Programs. New York: Holt, Rinehart and Winston, Inc., 1966.

Lewis, Arthur O., Jr. ed. Men and Machines. New York: E. P. Dutton & Co., Inc., 1963.

Loughary, John W. Man-Machine Systems in Education. New York: Harper & Row, 1966.

McLuhan, Marshall. Understanding Media. New York: McGraw-Hill Book Co., 1964.

Moseley, M. Irascible Genius: A Life of Charles Babbage. Chicago: Regnery Co., 1964.

National Cash Register Co. What is Binary Arithmetic? Dayton, Ohio: NCR.

National Council of Teachers of Mathematics, Computer-Assisted Instruction and the Teaching of Mathematics, Washington, D.C.: National Council of Teachers of Mathematics, 1969.

National School Public Relations Association.

a. Computers: New Era for Education? Washington, D.C.: N.S.P.R.A. 1968.

b. Technology in Education. Washington, D.C.: N.S.P.R.A. 1967.

Polya, George. How to Solve It. Princeton, N. J.: Princeton University Press, 1971

Books continued

Silberman, Charles. The Myths of Automation. New York: Harper and Row, 1966.

Stark, Peter A. Digital Computer Programming. New York: MacMillan Co., 1967

U.S. Atomic Energy Commission. Computers. Washington, D.C.: AEC.

Weiner, Norbert. God and Golem, Inc. Cambridge, Mass.: M.I.T. Press. 1964,

Willerding, Margaret F., From Fingers to Computers. Chicago, Ill. Lyons and Carnahan, 1970

Periodicals

Business Week. "Money Goes Electronic in the 1970's." Business Week 2002 (Special Report). January 13, 1968.

General Electric Forum. "The Information Explosion: The Computer in Society." The General Electric Forum 10, Winter 1967-1968.

Lunetta, Vincent N. and Dyrli, O. E., "Computers in the Science Curriculum-Some Concrete Applications in the Physical Sciences" Science Education, Vol. 54, No. 2, April-June 1970

Turing, A. M. "Can a Machine Think?" The World of Mathematics, Vol. 4, pp. 2099-2123.

ACM SIGCUE BULLETIN. Computer Uses in Education (Quarterly) Educational Technology (A monthly publication)

Audio Visual Materials

The Computer Revolution. 22 min., color, CBS-TV "21st Century" series. Distributor: Computer Instruction NETWORK, 4924 River Rd. N., Salem. Ore. 97303.

Engine at the Door. 30 min., b&w, National Educational Television (Film 6 from Computers and the Mind of Man series). Distributor: Audio-Visual Dection, Division of Continuing Education, Coliseum 131, Corvallis, Ore. 97331 (\$5.00).

Audio Visual Materials continued

The Remarkable Schoolhouse, Columbia Broadcasting System. Distributor:
McGraw-Hill, 1968

TOMORROW? 30 min., b&w, United Church of Christ, 1962. Distributor:
United Church of Christ, Audio-Visual Office, 1720 Choteau Ave.,
St. Louis, Mo. 63103 (\$8.00).

Accessing Computer Programs

Instructions to students:

The purpose of these programs is to introduce teachers to computer applications in education. The first module provides interactive experience with short simulations, tutorial dialog, and drill and practice in several academic areas; it touches upon evaluation of student responses and branching.

If you have never used a computer terminal before, this should present no problem. You don't have to know any special computer language to use these programs; all responses are made in English!

Six computer terminals are available for your use in Room _____

Two computer Terminals are available in Room _____

Instructions on terminal use are posted in those rooms. If you need special help or further information, contact the CBE coordinator at _____.

When you begin, the computer will ask for your ID number and first name.

Your computer ID number is: _____

1. Type in this number and your first name: _____,
then press the RETURN key on the right-hand side of the keyboard.
The computer will respond by asking: Is your last name _____?
2. Type: YES press the RETURN key. The computer will type:
Course Name?
3. Type: _____ press the RETURN key.

From here on you will be in the module and all instructions will be provided through the instructional program.

Sample Program RUNS

TEACH1 - This module allows users to experience some computer applications illustrating how computers may be used to facilitate learning in several academic areas. It includes short simulations, tutorial dialog, and drill and practice.

TEACH4 - This conversational dialog discusses the problems of implementations of computer support within a public school environment and provides suggestions to teachers to facilitate effective support.

PROJEC - This program was written in BASIC by a high school student to support instruction in his physics class.

HELLO!! WELCOME TO TEACHER EDUCATION MODULE #1.

IN THIS MODULE YOU'LL HAVE AN OPPORTUNITY TO EXPERIENCE SOME COMPUTER APPLICATIONS ILLUSTRATING HOW COMPUTERS MAY FACILITATE LEARNING. MY NAME IS VINCE LUNETTA; AS AUTHOR OF THIS MODULE I WILL BE YOUR GUIDE.

TWO NOTES BEFORE WE BEGIN:<

1. ALWAYS CONCLUDE YOUR TYPED RESPONSES BY PRESSING THE 'RETURN' KEY ON THE RIGHT-HAND SIDE OF YOUR KEYBOARD.
2. PRESS THE 'RETURN' KEY WHENEVER YOU WANT THE COMPUTER TO MOVE ALONG MORE QUICKLY TO THE NEXT SECTION OF THE LESSON.

TELL ME, HAVE YOU EVER USED A COMPUTER TERMINAL BEFORE? NO

DON'T BE AFRAID; THERE'S CERTAINLY NO NEED TO PANIC!

A COMPUTER IS MUCH LESS INTELLIGENT THAN YOU ARE; IT NEEDS EXPLICIT INSTRUCTIONS ON ANYTHING IT IS TO DO. COMPUTERS CAN, OF COURSE, BE MISUSED IN TEACHING. WITH CARE THOUGH, WE SHOULD BE ABLE TO EMPLOY THE COMPUTER AS AN EFFECTIVE AND APPROPRIATE TOOL TO SUPPLEMENT CLASSROOM INSTRUCTION.

DO YOU PERSONALLY BELIEVE THAT COMPUTERS CAN PLAY AN EFFECTIVE ROLE IN YOUR OWN CLASSROOM OR SCHOOL IN THE FORSEEABLE FUTURE? PLEASE RESPOND BY TYPING THE FOLLOWING CODE:

- 1 COMPUTERS CAN PLAY A VERY IMPORTANT ROLE IN THE FORSEEABLE FUTURE.
 - 2 COMPUTERS CAN PLAY AN IMPORTANT ROLE IN THE FORSEEABLE FUTURE.
 - 3 I'M NOT SURE.
 - 4 COMPUTERS CANNOT PLAY AN IMPORTANT ROLE IN THE FORSEEABLE FUTURE.
 - 5 COMPUTERS CAN IN NO WAY PLAY AN IMPORTANT ROLE IN THE FORSEEABLE FUTURE.
- 3
O.K.

ONE OF THE MOST BASIC COMPUTER APPLICATIONS IS CALLED 'DRILL AND PRACTICE'. HERE ARE FOUR EXERCISES IN ELEMENTARY ARITHMETIC. DON'T BE AFRAID TO MAKE MISTAKES IN THIS MODULE; YOU'LL WANT TO SEE HOW THEY'RE HANDLED BY THIS BRILLIANT (?) INSTRUCTIONAL PROGRAM.

WOULD YOU LIKE TO TRY YOUR TALENTS IN ADDITION OR IN MULTIPLICATION? MULTIPLICATION

2 X 3 = 6
GREAT!!

7 X 9 = 34
 NO, TRY AGAIN.
 34

SORRY. 7 X 9 = 63

FOR EACH QUESTION THE AUTHOR CAN SPECIFY THE NUMBER OF TIMES A STUDENT MAY MAKE AN INCORRECT RESPONSE BEFORE BEING GIVEN HELP OR THE CORRECT ANSWER.

NORMALLY DRILL AND PRACTICE EXERCISES ARE TIMED. THE TEACHER CAN SPECIFY THE AMOUNT OF TIME AN INDIVIDUAL STUDENT MAY HAVE FOR HIS RESPONSE. TO BEST MEET THE NEEDS OF OUR TEACHER EDUCATION MODULE HERE, I HAVE SELECTED A NONTIMED MODE FOR YOU.
 NOW, WE'LL CONTINUE.

5 X 3 = 15
 NICE!!

12 X 12 = 144
 BEAUTIFUL!!

O.K. WE MADE IT THROUGH ARITHMETIC -- IN A FASHION.
 YOUR SCORE HAS BEEN FILED FOR FUTURE REFERENCE BY THE TEACHER OR FOR USE BY THE COMPUTER IN BRANCHING YOU TO INSTRUCTIONAL MATERIAL APPROPRIATE FOR YOUR OWN INDIVIDUAL NEEDS. YOUR RESPONSES HAVE ALSO BEEN PLACED IN A STATISTICAL FILE FOR ME (THE AUTHOR) TO USE WHEN I EVALUATE THE DESIGN OF THE MODULE.

NOW, LET'S TRY A DRILL AND PRACTICE LANGUAGE EXERCISE. THE COMPUTER WILL TYPE A FRENCH WORD OR PHRASE AND YOU TYPE THE ENGLISH EQUIVALENT.

MERCI THANKS
 QUITE RIGHT!

AU REVOIR BYE-BYE
 GOOD!

VIN BLANC WATER
 COME ON NOW! WHAT DO FRENCHMEN LIKE TO DRINK?
 WINE
 OUI. VIN BLANC MEANS WHITE WINE.
 WHEN I SEE YOU, YOU CAN TREAT ME TO A ROUND!

I DON'T SUPPOSE WE QUALIFY AS FRENCHMEN YET, BUT PERHAPS WE'RE ON THE WAY. AGAIN YOUR PROGRESS HAS BEEN PROPERLY RECORDED. IF A STUDENT MISSES CERTAIN KINDS OF PROBLEMS, THE COMPUTER CAN BRANCH HIM TO EASIER PROBLEMS, PROVIDE HELP, OR REPEAT PROBLEMS WITH WHICH HE HAS HAD DIFFICULTY -- IF THE AUTHOR BUILDS THIS INTO THE INSTRUCTIONAL PROGRAM.

NOW READ THE WORDS OF RENE DESCARTES AS HE CONTEMPLATED THE COMPUTER: COGITO ERGO SUM .
TRANSLATED: 'I THINK THEREFORE I AM'.

HOW MANY VERBS ARE THERE IN THE ENGLISH TRANSLATION? 3
NO. YOU'D BETTER LOOK AGAIN.
TWO
FINE!

TYPE A SENTENCE USING ONE OF THOSE TWO VERBS.
I LIKE TO THINK
O.K., I'LL ACCEPT THAT; YOU DID SPELL 'THINK' PROPERLY.

WHAT IS THE TENSE OF THOSE VERBS? PAST
COME ON NOW. THESE VERBS SHOW ACTION NOW. TRY ANOTHER TENSE.
FUTURE
THESE VERBS DON'T DESCRIBE ACTION THAT IS GOING TO HAPPEN.
THE ACTION IS NOW. TRY ANOTHER TENSE.
PRESENT
CERTAINLY!

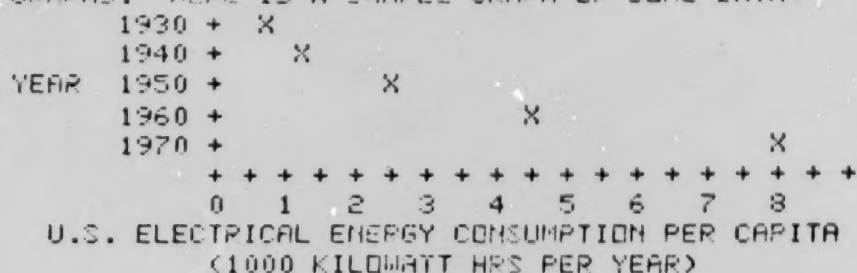
YOU MAY HAVE NOTED THAT THE QUOTATION FROM DESCARTES WAS STATED IN A MISLEADING CONTEXT. IF THE HUMAN AUTHOR PROVIDES INCORRECT INFORMATION, THE TUTORIAL PROGRAM WILL PASS IT ALONG TO STUDENTS. A WRITTEN PROGRAM SHOULD, OF COURSE, BE REVIEWED AND IMPROVED WITH TIME.

ONE OF THE NICEST COMPUTER APPLICATIONS IN LEARNING IS THE SIMULATION OF REAL WORLD EVENTS. IN A SIMULATION THE STUDENT MANIPULATES CERTAIN VARIABLES AND OBSERVES THE EFFECTS OF THOSE VARIABLES ON THE SYSTEM UNDER STUDY. HERE NOW IS A SHORT SIMULATION (WRITTEN IN BASIC).

THIS PROGRAM SIMULATES POPULATION GROWTH. THROUGH IT YOU WILL DETERMINE THE POPULATION OF THE UNITED STATES AT SOME FUTURE YEAR.
 IN 1970 THE POPULATION OF THE UNITED STATES WAS 203.8 MILLION PEOPLE. AT THAT TIME THE ANNUAL GROWTH RATE WAS 1.1%.
 WHAT ANNUAL GROWTH RATE WOULD YOU LIKE TO STUDY IN THIS SIMULATION (EXPRESS AS A %; DO NOT TYPE THE % SIGN)?10
 BASED ON THE 1970 POPULATION AND AN ANNUAL GROWTH RATE OF 10 %, AT WHAT FUTURE YEAR WOULD YOU LIKE ME TO PREDICT THE POPULATION OF THE UNITED STATES?2000
 IN 2000 THE U.S. POPULATION WILL BE 3556 MILLION.
 WOULD YOU LIKE TO LOOK AT THE POPULATION IN ANOTHER YEAR?no

BY INTERACTING WITH CERTAIN SIMULATED MODELS, STUDENTS MAY GAIN IMPORTANT EXPERIENCE MORE QUICKLY THAN THROUGH OTHER INSTRUCTIONAL TECHNIQUES. THIS SIMULATION COULD HAVE BEEN MORE THOROUGH HAD WE ALLOWED THE STUDENT TO CHANGE ADDITIONAL VARIABLES SUCH AS BIRTH RATE, DEATH RATE, MIGRATION RATES, ... GRAPHIC OR TABULAR DISPLAYS MIGHT ALSO HAVE BEEN APPROPRIATE.

THE UNDERSTANDING OF GRAPHIC RELATIONSHIPS CAN BE ENHANCED BY COMPUTER DIALOG INVOLVING THE STUDENT IN THE INTERPRETATION OF GRAPHS. HERE IS A SAMPLE GRAPH OF SOME DATA:



READ FROM THE GRAPH THE PER CAPITA CONSUMPTION IN 1945. WHAT VALUE DO YOU ESTIMATE IN KILOWATT HOURS PER YEAR? 1.5
 ENERGY UNITS ARE 1000KW-HRS/YEAR. MULTIPLY YOUR ANSWER BY 1000. 1500
 O.K. I'LL ACCEPT THAT; I READ APPROXIMATELY 1700.

IF PER CAPITA CONSUMPTION CONTINUES TO GROW AT THE SAME RATE AS IN RECENT DECADES, PREDICT THE VALUE FOR 1980. 16000
 BASED ON THE LIMITED DATA SHOWN HERE, THAT'S A REASONABLE PREDICTION.

IF YOU ARE USING A VIDEO TERMINAL YOU ARE NOW DESERVING ONE OF THEIR MOST SEVERE LIMITATIONS. THE SCREEN DISPLAYS ONLY TWENTY LINES OF TYPE, AND THE NUMBER OF QUESTIONS I CAN ASK ABOUT ANY GIVEN VIDEO DISPLAY IS SEVERELY LIMITED. ON THE OTHER HAND, VIDEO TERMINALS ARE NORMALLY FASTER, QUIETER, AND EASIER TO READ THAN CONTEMPORARY TELETYPEWRITER TERMINALS. THIS PARTICULAR GRAPH COULD HAVE BEEN DUPLICATED AND DISTRIBUTED TO STUDENTS BEFORE THEY SIGNED ON THE COMPUTER FOR THIS LESSON.

CAN MAN BECOME A VICTIM OF HIS OWN TECHNOLOGY?

YES

CAN SCHOOLS HAVE A ROLE IN HELPING MEN MASTER TECHNOLOGY?

YES

ONE OF THE BYPRODUCTS OF COMPUTER USE IN EDUCATION IS THAT STUDENTS MAY WELL DEVELOP A PERCEPTION OF THE POTENTIAL AND LIMITATIONS OF OTHER COMPUTER APPLICATIONS IN SOCIETY.

HAVE YOU OBSERVED ANY PROBLEMS OR LIMITATIONS IN THIS MODULE?

YES

IN SPITE OF ITS ASSETS, THERE CERTAINLY ARE LIMITATIONS IN THE COMPUTER'S ABILITY TO DEAL WITH INDIVIDUAL STUDENT PROBLEMS IN LEARNING, AND STUDENTS RECOGNIZE THIS READILY.

AS A RESULT OF INITIAL ENCOUNTERS WITH COMPUTERS SOME STUDENTS WILL WANT TO LEARN MORE ABOUT THEM, AND THEY SHOULD BE ENCOURAGED TO DO SO. STUDENTS WHO HAVE LEARNED A SYMBOLIC PROGRAMMING LANGUAGE ARE IN A FAR BETTER POSITION TO WORK WITH REALISTIC PROBLEMS THAN ARE THEIR CLASSMATES. HERE FOR EXAMPLE, IS A PROGRAM WRITTEN IN BASIC BY ONE OF MY FORMER HIGH SCHOOL STUDENTS IN SUPPORT OF A HIGH SCHOOL COURSE IN MATHEMATICS:

THIS PROGRAM SIMULATES THE RANDOM POLLING OF A PAIR OF DICE AND RECORDS HOW MANY TIMES EACH NUMBER (2-12) APPEARED.

THIS COMPUTER WILL TAKE APPROXIMATELY 10 SEC. TO CALCULATE
EACH 1000 ROLLS --
HOW MANY ROLLS DO YOU WANT ME TO SIMULATE?10

DICE SUM	NO. OF ROLLS	REAL % OF 10	IDEAL DISTRIBUTION % OF 10
2	1	10	2.7
3	0	0	5.5
4	3	30	8.3
5	2	20	11.1
6	0	0	13.8
7	1	10	16.6
8	1	10	13.8
9	1	10	11.1
10	1	10	8.3
11	0	0	5.5
12	0	0	2.7

DO YOU WANT TO ROLL THE DICE AGAIN?NO

THIS STUDENT-AUTHORED PROGRAM ALLOWED THE STUDENT AND HIS CLASS-
MATES TO SIMULATE QUANTITIES OF DATA BASED UPON THE GENERATION OF
RANDOM NUMBERS WITHIN THE COMPUTER. THEY WOULD NEVER HAVE HAD
TIME TO HANDLE SUCH DATA IN CLASS WITHOUT COMPUTER POWER.
FURTHERMORE, THE MATHEMATICAL CONCEPTS INVOLVED HAD TO BE
LOGICALLY ORGANIZED TO WRITE A PROGRAM THAT WOULD WORK PROPERLY.

OTHER STUDENTS HAVE WRITTEN EFFECTIVE PROGRAMS TO PROCESS AND
EVALUATE DATA COLLECTED FROM THE COMMUNITY, FROM THEIR
CLASSMATES, AND FROM LAB EXPERIMENTS.

YOU'VE BEEN WORKING WITH THIS MODULE FOR QUITE SOME TIME NOW;
AS AUTHOR I'D APPRECIATE ANY COMMENTS YOU'D CARE TO MAKE
REGARDING IT. PLEASE TYPE YOUR COMMENTS NOW; INDICATE THE
COMPLETION OF YOUR MESSAGE BY TYPING TWO ASTERISKS: **
NICE! ♦♦

THIS MODULE HAS BEEN WRITTEN IN A SPECIAL LANGUAGE FOR AUTHORS OF DIALOG; IT'S CALLED 'INTERACTIVE DIALOGUE FACILITY' (IDF). SOME OF THE POWER OF IDF HAS NOT BEEN DEMONSTRATED IN THIS SHORT LESSON, BUT I DO ENCOURAGE YOU TO LOOK FURTHER FOR POTENTIAL APPLICATIONS WHICH WILL EFFECTIVELY SUPPLEMENT YOUR OWN TEACHING. IDF MANUALS ARE AVAILABLE WHICH ARE EASY TO UNDERSTAND.

NOW THAT YOU'VE HAD OCCASION TO WORK WITH THIS MODULE --

DO YOU PERSONALLY BELIEVE THAT COMPUTERS CAN PLAY AN EFFECTIVE ROLE IN YOUR OWN CLASSROOM OR SCHOOL IN THE FORSEEABLE FUTURE? PLEASE RESPOND BY TYPING THE FOLLOWING CODE:

- 1 COMPUTERS CAN PLAY A VERY IMPORTANT ROLE IN THE FORSEEABLE FUTURE.
- 2 COMPUTERS CAN PLAY AN IMPORTANT ROLE IN THE FORSEEABLE FUTURE.
- 3 I'M NOT SURE.
- 4 COMPUTERS CANNOT PLAY AN IMPORTANT ROLE IN THE FORSEEABLE FUTURE.
- 5 COMPUTERS CAN IN NO WAY PLAY AN IMPORTANT ROLE IN THE FORSEEABLE FUTURE.

2

THANKS; IT'S BEEN NICE WORKING WITH YOU.

AU REVOIR FOR NOW ...

DAS IST ALLES FUR HEUTE.

END OF COURSE

HELLO!! WELCOME TO TEACHER EDUCATION MODULE #4.

THE PURPOSE OF THIS MODULE IS TO DISCUSS IMPLEMENTATION OF COMPUTER-PACED MODULES WITHIN A PUBLIC SCHOOL ENVIRONMENT.

HAVE YOU COMPLETED TEACHER EDUCATION MODULE #1 ENTITLED TEACH ? YES
FINE.

DO YOU ALREADY HAVE ONE OR MORE COMPUTER-BASED MODULES YOU PLAN TO USE WITH YOUR STUDENTS?

NO

TEACHER EDUCATION MODULES #2 AND #3 DEAL WITH THE SELECTION OF MODULES AND WITH MODULE DESIGN. YOU MAY FIND THEM TO BE HELPFUL WHEN YOU ATTEMPT TO SECURE APPROPRIATE SOFTWARE.

IN RECENT YEARS MANY TEACHERS HAVE BEEN ABLE TO MOVE TOWARD TEACHING STRATEGIES FOSTERING INDIVIDUALIZED LEARNING. PROponents OF INDIVIDUALIZATION BELIEVE THAT PEOPLE LEARN BEST IN THEIR OWN UNIQUE WAYS AND AT DIFFERENT RATES. LEARNERS VARY IN EXPERIENCE, ABILITY, AND MOTIVATION; THEY DIFFER IN THE LENGTH OF TIME THEY NEED TO MASTER SPECIFIC CONCEPTS.

IN SOME CONTEMPORARY PROGRAMS THE STUDENT FOLLOWS A CORE SEQUENCE OF MATERIAL AT HIS OWN PACE AND PURSUES EXCURSIONS PARTICULARLY RELEVANT TO HIS OWN INTERESTS AND NEEDS. HIS PROGRESS IS EVALUATED AT REGULAR INTERVALS, AND WITH THE TEACHER'S ASSISTANCE, RESPONSIBILITY IS GENERALLY PLACED ON THE STUDENT'S SHOULDERS TO PLAN AND IMPLEMENT HIS OWN PROGRAM OF STUDIES.

IS YOUR CURRENT TEACHING ENVIRONMENT (1) HIGHLY INDIVIDUALIZED, LIKE THE ONE DESCRIBED ABOVE, (2) MODERATELY INDIVIDUALIZED, OR (3) GROUP-PACED, I.E., TRADITIONAL? 3
EVEN IN A 'GROUP-PACED' CLASSROOM, INDIVIDUALIZED, COMPUTER-BASED MODULES CAN PLAY AN EFFECTIVE SUPPORTING ROLE. THERE ARE, OF COURSE, REAL PROBLEMS IN SCHEDULING COMPUTER TIME WHEN A LIMITED NUMBER OF TERMINALS ARE AVAILABLE SINCE ALL STUDENTS WILL HAVE TO WORK THROUGH ONE OR MORE MODULES IN A LIMITED PERIOD OF TIME. THE PROBLEMS ARE MANAGEABLE, HOWEVER. STUDENTS MAY BE BROUGHT THROUGH THE ACTIVITIES AND SKILLS WHICH ARE PREREQUISITE TO THE COMPUTER-PAID UNIT PRIOR TO ASSIGNING THE MODULE. DURING THE PERIOD OF TIME ALLOTTED FOR STUDENTS TO WORK THROUGH THE MODULES, THE CLASS MAY OPERATE IN AN 'INDEPENDENT STUDY' MODE WITH FORMAL CLASS SESSIONS SUSPENDED OR CLASS MEETINGS COULD BE BASED UPON ACTIVITIES NOT DIRECTLY DEPENDENT UPON THE COMPUTER-BASED MATERIALS.

KNOWING WHAT YOU ALREADY DO ABOUT COMPUTER-BASED MODULES, WOULD YOU CLASS THEM GENERALLY AS EXAMPLES OF GROUP-PACED OR INDIVIDUALIZED INSTRUCTION?

PLEASE TYPE INDIVIDUAL OR GROUP . I DIDN'T UNDERSTAND.
INDIVIDUAL

I AGREE. SOME OF THE COMPUTER MODULES I'VE SEEN, THOUGH, HAVE BEEN RATHER POOR EXAMPLES OF INDIVIDUALIZATION WITH LITTLE OR NO BRANCHING FOR INDIVIDUAL STUDENT DIFFERENCES. HOPEFULLY, THE MODULES YOU CONSTRUCT WILL PROVIDE EFFECTIVELY FOR INDIVIDUAL DIFFERENCES.

STUDENTS MOVING THROUGH INDIVIDUALIZED COMPUTER-BASED MODULES WILL DO SO AT DIFFERENT RATES WHETHER OR NOT THE COURSE IN WHICH THEY ARE ENROLLED IS SELF-PACED. WHEN STUDENTS ARE WORKING WITH COMPUTER MODULES THE TEACHER'S ROLE SHOULD BE DIFFERENT THAN IT IS IN A MORE CONVENTIONAL GROUP-PACED ENVIRONMENT. THE TEACHER'S ROLE IS THAT OF TUTOR OR GUIDE. WHILE THE STUDENTS INTERACT WITH THE INSTRUCTIONAL PROGRAM, THE TEACHER SPENDS HIS TIME WORKING WITH STUDENTS ON AN INDIVIDUAL BASIS GIVING ATTENTION TO STUDENTS WHO HAVE SPECIAL PROBLEMS.

DO YOUR CURRENT TEACHING STRATEGIES ALLOW YOU TO SPEND

- (1) A LARGE AMOUNT OF CLASS TIME,
- (2) A MODERATE AMOUNT OF CLASS TIME,
- (3) A MINIMAL AMOUNT OF CLASS TIME

IN DEALING WITH THE CONCEPTUAL PROBLEMS OF STUDENTS ON AN INDIVIDUAL BASIS.

3

WHEN YOUR STUDENTS USE A NUMBER OF WELL DESIGNED, COMPUTER-BASED MODULES IN PLACE OF CONVENTIONAL CLASS ACTIVITY, YOU SHOULD BE FREED TO SPEND MORE TIME WITH STUDENTS HAVING SPECIAL PROBLEMS.

WELL WRITTEN COMPUTER MODULES MAY TERMINATE EARLY FOR STUDENTS HAVING DIFFICULTY WITH SPECIFIC CONCEPTS AND DIRECT THE STUDENT TO CONSULT HIS TEACHER BEFORE PROCEEDING. THESE STUDENTS WILL HAVE EXHAUSTED THE COMPUTER HELP MESSAGES OR EXCEEDED A CERTAIN ERROR RATE.

A NON-THREATENING ATTITUDE SHOULD EXIST SUCH THAT STUDENTS WHOSE MODULES HAVE BEEN TERMINATED DUE TO POOR UNDERSTANDING OF A CONCEPT READILY COME FOR CONSULTATION WITH THEIR TEACHER. DURING DISCUSSION THE TEACHER MAY WELL PROVIDE REMEDIAL ASSISTANCE TO THE STUDENT AND THEN SUGGEST A NEW STARTING POINT FOR HIM IN AN APPROPRIATE MODULE.

DO YOU FEEL YOU ARE CURRENTLY UTILIZING AN APPROPRIATE SYSTEM FOR THE EVALUATION OF STUDENT PROGRESS IN YOUR TEACHING?

YES

THAT MAY BE, BUT I'M NOT CONVINCED THAT CONTEMPORARY EVALUATION SYSTEMS ARE ESPECIALLY RELIABLE. THERE CERTAINLY ARE A LOT OF POORLY DEFINED ISSUES AND CRITERIA IN STUDENT EVALUATION TODAY.

WELL DESIGNED INSTRUCTIONAL PROGRAMS SHOULD END WITH OPEN-ENDED PERHAPS EVEN DIVERGENT ASSIGNMENTS FOR STUDENTS WHERE APPROPRIATE. THE STUDENT SHOULD BE ASKED TO PURSUE THE IDEAS DEVELOPED IN THE MODULE BEYOND THE CONSTRAINTS OF THE COMPUTER TERMINAL ENVIRONMENT. IN A LABORATORY SIMULATION, FOR EXAMPLE, HE SHOULD LIST SOURCES OF EXPERIMENTAL ERROR AS HE ENVISIONS THEM, HE SHOULD CRITIQUE THE LIMITATIONS OF THE SIMULATION, AND HE SHOULD CONTINUE TO INVESTIGATE THE PHENOMENA THAT WERE SIMULATED.

HOW MANY COMPUTER TERMINALS ARE TO BE AVAILABLE IN YOUR SCHOOL THIS YEAR?

2

YOU ARE DESTINED TO ENCOUNTER COMPLICATIONS IN THE SCHEDULING OF COMPUTER TIME WHEN YOU WANT NUMBERS OF STUDENTS TO BE INVOLVED IN COMPUTER USE.

INDIVIDUAL STUDENTS SHOULD BE ABLE TO RESERVE BLOCKS OF COMPUTER TIME FOR THEIR OWN USE BY REGISTERING IN ADVANCE ON A CALENDAR POSTED IN THE TERMINAL ROOM. THE CALENDAR WILL PROVIDE TEACHERS WITH AN OVERVIEW OF STUDENT USE, AND IN TIMES OF HIGH USAGE PRIORITY CAN BE GIVEN TO STUDENTS ON SPECIFIC PROJECTS. PRIORITIES SHOULD BE SET MUTUALLY BY TEACHERS WHOSE STUDENTS ARE INVOLVED IN COMPUTER USE.

HAVE YOU EVER SAT DOWN WITH TEACHERS FROM ANOTHER DEPARTMENT TO DISCUSS ACADEMIC OR CURRICULUM MATTERS?

YES

GOOD. YOU'RE OFF TO A GOOD START. ALLOCATION OF COMPUTER PRIORITIES CAN PROVIDE A GOOD STARTING POINT FOR AN INTER-DEPARTMENTAL MEETING.

WHEN TERMINAL TIME IS AT A PREMIUM ONE OF THE OBVIOUS WAYS TO IMPROVE EFFICIENCY IS TO INCREASE USAGE DURING NON-SCHOOL HOURS. FOR MAXIMUM EFFICIENCY THE SYSTEM SHOULD BE AVAILABLE 24 HOURS PER DAY, SEVEN DAYS PER WEEK.

DO YOU ANTICIPATE THAT YOUR TERMINALS WILL BE AVAILABLE 24 HOURS PER DAY, SEVEN DAYS PER WEEK FOR STUDENT USE?

NO

THIS IS NOT AN UNUSUAL SITUATION. MANY SCHOOLS ARE CLOSED MORE THAN 16 HOURS OUT OF EACH 24! BUT THERE ARE DEFINITE THINGS YOU CAN DO TO STIMULATE USE IN OFF-HOURS, ON WEEKENDS, AND DURING VACATIONS. THE FIRST THING TO DO IS TO SEE THAT THE SCHOOL IS OPEN AND ACCESSIBLE FOR AS MANY HOURS AS POSSIBLE. (THERE IS, OF COURSE, THE VERY REAL PROBLEM OF TERMINAL AND BUILDING SECURITY. MALICIOUS MISCHIEF THRIVES IN UNSUPERVISED PUBLIC PLACES.) ANOTHER APPROACH IS TO PLACE A 'DIAL-UP' TERMINAL IN A PUBLIC LIBRARY OR EVEN IN THE POLICE STATION FOR EASY STUDENT ACCESS DURING OFF-HOURS.

WHEN UNINITIATED STUDENTS ATTEMPT TO ACCESS COMPUTER MODULES, MINOR COMPLICATIONS FREQUENTLY ENSUE. IN THEIR FIRST INTERACTIVE SESSIONS, QUESTIONS REGARDING THE TERMINAL AND SYSTEM INSTRUCTIONS ARE ALMOST INEVITABLE. TRAINED STUDENTS CAN READILY PROVIDE THIS HELP IF THEY ARE AVAILABLE. SUCH HELP CAN BE PROVIDED FORMALLY IF A STUDENT COMPUTER CLUB IS ORGANIZED TO PROVIDE IT OR IF A PARAPROFESSIONAL IS HIRED TO FULFILL THAT AND RELATED TASKS.

DO YOU ANTICIPATE THAT YOUR SCHOOL WILL HIRE A PARAPROFESSIONAL FOR THAT PURPOSE?

NO

THE NEED FOR PARAPROFESSIONAL SUPPORT PERHAPS OUGHT TO BE RAISED WITH YOUR SCHOOL BOARD. HOWEVER, DON'T UNDERESTIMATE THE ASSISTANCE THAT STUDENTS CAN PROVIDE. THE EXPERIENCE ALLOWS THEM TO CONTRIBUTE TO THEIR SCHOOL, AND IT PROVIDES VALUABLE LEARNING OPPORTUNITIES FOR THEM AS WELL.

AS WE MOVE TOWARD MORE EXTENSIVE COMPUTER USE IN TEACHING WE OUGHT TO REASSESS OUR STAFFING PATTERNS TO DETERMINE IF THERE IS A MORE OPTIMAL ARRANGEMENT THAN THE ONE CURRENTLY IN USE. WITH THE HELP OF AIDES AND INTERN TEACHERS A TEACHER WHO HAS DEVELOPED AN EFFECTIVE INDIVIDUALIZED COURSE SHOULD BE ABLE TO WORK WITH LARGER NUMBERS OF STUDENTS IN A QUALITY INSTRUCTIONAL ENVIRONMENT. WITH A "MASTER TEACHER" IN CHARGE OF TEACHING AND DEVELOPMENT IN A COURSE, A SCHOOL WOULD HAVE AN EFFECTIVE VEHICLE FOR TRAINING TEACHERS AND FOR ENCOURAGING QUALITY WITHIN AN INSTRUCTIONAL PROGRAM DESIGNED TO PROVIDE FOR STUDENT DIFFERENCES.

CAN COMPUTERS HAVE A DEHUMANIZING INFLUENCE ON A CLASSROOM ENVIRONMENT?

YES

I AGREE WITH YOU!

IN MY OPINION, COMPUTERS LIKE OTHER TECHNOLOGICAL DEVICES CAN BE SERIOUSLY MISUSED BY THE CLASSROOM TEACHER -- ALTHOUGH I DON'T BELIEVE THAT MISUSE IS INEVITABLE. IN THE HANDS OF CONCERNED, SENSITIVE TEACHERS, I BELIEVE THAT SUCH DEVICES CAN ENHANCE THE LEARNING PROCESS. WE SHOULD UTILIZE TECHNOLOGICAL DEVICES TO HELP US MEET MORE EFFECTIVELY THE LEARNING GOALS OF OUR STUDENTS. LET US BE CONCERNED AND SENSITIVE!!

AS YOU MOVE TOWARD MORE EXTENSIVE USE OF THE COMPUTER AS A RESOURCE IN YOUR CLASSROOM ENVIRONMENT, DO YOU ENVISION PROBLEMS AND COMPLICATIONS THAT WILL BE (1) VERY MINOR, (2) MODERATE BUT MANAGEABLE, (3) OVERWHELMING ?

2

GOOD! KEEP YOUR EYES OPEN AND DEAL WITH THOSE PROBLEMS THAT DO ARISE.

BEST WISHES! SO LONG FOR NOW!!

RUN
 ???
 RUN
 PROJEC

THIS PROGRAM SIMULATES THE MOTION OF A PROJECTILE.
 YOU ARE FIRING A PROJECTILE FROM A MORTAR.
 WHAT MUZZLE VELOCITY DO YOU THINK WOULD BE APPROPRIATE IN FT/SEC?500
 AT WHAT ANGLE WILL YOU FIRE IT (0-90 DEGREES)?40

THE PROJECTILE REACHED A MAXIMUM HEIGHT OF 1605 FT.
 AND THE RANGE WAS 7646 FT.

NOW LET'S SEE WHAT WOULD HAPPEN IF WE CHANGED THE
 ANGLE AND LEFT THE MUZZLE VELOCITY THE SAME.

ANGLE	HEIGHT	RANGE
0	0	0
15	260	3883
30	971	6725
45	1942	7763
60	2912	6720
75	3622	3874
90	3881	0

WOULD YOU LIKE TO FIRE ANOTHER PROJECTILE WITH
 A NEW MUZZLE VELOCITY?NO

WOULD YOU LIKE TO TAKE A FUN QUIZ ON THIS MATERIAL?YES

YOUR FRIENDLY PHYSICS TEACHER IS 5942 FT FROM YOU. AT WHAT
 ANGLE WOULD YOU FIRE THE SHELL USING THE ABOVE VELOCITY?20

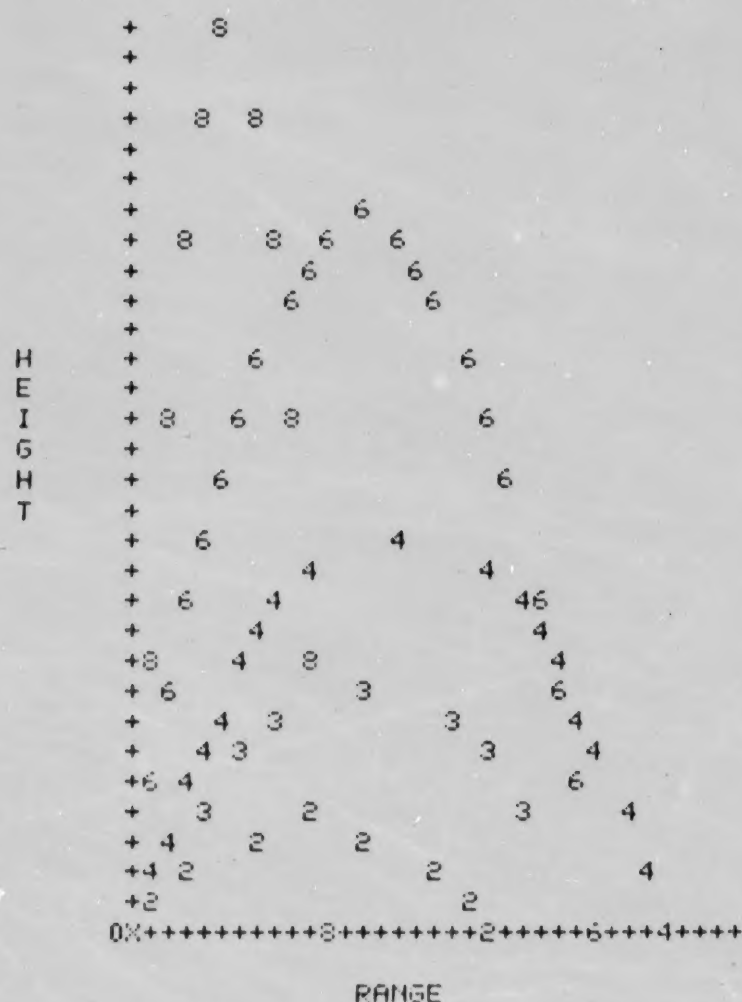
GOOD SHOT! THE PRINCIPAL IS LOOKING FOR YOU.

YOU ARE A CLOWN BEING SHOT FROM A CANNON AND
THE NET IS 150 FT AWAY.
THE GUNNER IS FIRING YOU AT AN ANGLE OF 45 DEGREES
AT WHAT VELOCITY DO YOU TELL HIM TO FIRE YOU?60

YOU MISSED; IT WAS NICE KNOWING YOU.

THAT SPEED TOOK YOU A DISTANCE OF 111 FT.

WOULD YOU LIKE TO SEE A GRAPH OF WHAT WE'VE LEARNED?YES



THE DIGITS IN THE GRAPH ABOVE REPRESENT THE ANGLE/10
OF INCLINATION OF THE GUN TUBE.

DONE

**IDF Files
and
PROGRAM LISTINGS**

LESSON FILENAME? TEACH1
 IS YOUR NAME V.LUNETTA? YES
 FILE COPENED?

COMMAND? DUMP

LESSON NAME =TEACH2

VERSION NUMBER 113

CURRENT LESSON OPTIONS

ANSWER TYPE = STRING
 NO TIMEOUTS TO BE USED

ALLOW DEMOS YES
 AUTO-UPSHIFT? YES
 REMOVE BLANKS? YES
 ALLOW //TS? NO
 ALLOW //CALC? NO
 ALLOW //GOTO? NO
 AUTOMATIC QUESTION NUMBERS? NO
 REDISPLAY? NO
 TRIALS = 2
 RESPONSE FILENAME= RESP1
 STATISTICS FILENAME= STAT1
 TIME = 100

SECTION # 1

SECTION OPTIONS:

KEYWORD
 1 TRIALS = 1

TEXT:

2 HELLO!! WELCOME TO TEACHER EDUCATION MODULE #1.
 3
 4 IN THIS MODULE YOU'LL HAVE AN OPPORTUNITY TO EXPERIENCE SOME
 5 COMPUTER APPLICATIONS ILLUSTRATING HOW COMPUTERS MAY
 6 FACILITATE LEARNING. MY NAME IS VINCE LUNETTA. AS AUTHOR OF
 7 THIS MODULE I WILL BE YOUR GUIDE.
 8
 9 TWO NOTES BEFORE WE BEGIN:
 10 1. ALWAYS CONCLUDE YOUR TYPED RESPONSES BY PRESSING THE
 11 RETURN KEY ON THE RIGHT-HAND SIDE OF YOUR KEYBOARD.
 12 2. PRESS THE RETURN KEY WHENEVER YOU WANT THE COMPUTER
 13 TO MOVE ALONG MORE QUICKLY TO THE NEXT SECTION OF THE LESSON.

QUESTION:

14 TELL ME, HAVE YOU EVER USED A COMPUTER TERMINAL BEFORE? 1

CORRECT ANSWER GROUP

15 #YES#

REPLY FOR THIS GROUP:

16 WELL IN THAT CASE, YOU KNOW THE COMPUTER WON'T HURT YOU!

FAILURE MESSAGE:

17 DON'T BE AFRAID; THERE'S CERTAINLY NO NEED TO PANIC!

SECTION # 2

TEXT:

1 A COMPUTER IS MUCH LESS INTELLIGENT THAN YOU ARE; IT NEEDS
2 EXPLICIT INSTRUCTIONS ON ANYTHING IT IS TO DO. COMPUTERS
3 CAN, OF COURSE, BE MISUSED IN TEACHING. WITH CARE THOUGH, WE
4 SHOULD BE ABLE TO EMPLOY THE COMPUTER AS AN EFFECTIVE AND
5 APPROPRIATE TOOL TO SUPPLEMENT CLASSROOM INSTRUCTION.

QUESTION:

6 DO YOU PERSONALLY BELIEVE THAT COMPUTERS CAN PLAY AN EFFECTIVE
7 ROLE IN YOUR OWN CLASSROOM OR SCHOOL IN THE FORSEEABLE FUTURE?
8 PLEASE RESPOND BY TYPING ONE OF THE FOLLOWING NUMBERS:
9 1 COMPUTERS CAN PLAY A VERY IMPORTANT ROLE IN THE FORSEEABLE
10 FUTURE.
11 2 COMPUTERS CAN PLAY AN IMPORTANT ROLE IN THE FORSEEABLE FUTURE
12 3 I'M NOT SURE.
13 4 COMPUTERS CANNOT PLAY AN IMPORTANT ROLE IN THE FORSEEABLE
14 FUTURE.
15 5 COMPUTERS CAN IN NO WAY PLAY AN IMPORTANT ROLE IN THE
16 FORSEEABLE FUTURE.

CORRECT ANSWER RANGE

17 MIN: 1
17 MAX: 5

REPLY FOR THIS RANGE:

18 O.K.

WRONG ANSWER RANGE:

19 MIN:-1.000000E+30
19 MAX: 1.000000E+30

REPLY FOR THIS RANGE:

20 PLEASE INDICATE YOUR FEELINGS BY TYPING 1,2,3,4, OR 5.

FAILURE MESSAGE:

21 OH WELL, WE'LL GO ON ANYWAY.

SECTION OPTIONS:

KEYWORD

1 TRIALS = 3

TEXT:

2 ONE OF THE MOST BASIC COMPUTER APPLICATIONS IS CALLED 'DRILL AND
3 PRACTICE'. HERE ARE FOUR EXERCISES IN ELEMENTARY ARITHMETIC.
4 DON'T BE AFRAID TO MAKE MISTAKES IN THIS MODULE; YOU'LL WANT TO
5 SEE HOW THEY'RE HANDLED BY THIS BRILLIANT (?) INSTRUCTIONAL
6 PROGRAM.

QUESTION:

7 WOULD YOU LIKE TO TRY YOUR TALENTS IN ADDITION OR IN
8 MULTIPLICATION? 1

CORRECT ANSWER GROUP

9 ADD

WRONG ANSWER GROUP:

10 MUL

REPLY FOR THIS GROUP:

11 BRANCH- 8

REPLY TO UNEXPECTED ANSWER:

12 PLEASE TYPE 'ADDITION' OR 'MULTIPLICATION'.

SECTION # 4

QUESTION:

1 4+2=6

CORRECT ANSWER RANGE

2 MIN: 6

3 MAX: 6

REPLY FOR THIS RANGE:

4 GREAT!

WRONG ANSWER RANGE:

4 MIN:-1.00000E+30

4 MAX: 1.00000E+30

REPLY FOR THIS RANGE:

5 NO, TRY AGAIN.

FAILURE MESSAGE:

6 4+2=6

SECTION # 5

QUESTION:

1 $9 + 8 = 1$

CORRECT ANSWER RANGE

2 MIN: 17

2 MAX: 17

REPLY FOR THIS RANGE:

3 NICE!!

WRONG ANSWER RANGE:

4 MIN:-1.00000E+30

4 MAX: 1.00000E+30

REPLY FOR THIS RANGE:

5. INCORRECT, TRY AGAIN.

REPLY TO UNEXPECTED ANSWER:

6 ???

FAILURE MESSAGE:

7 $9 + 8 = 17$

SECTION # 6

TEXT:

1 FOR EACH QUESTION THE AUTHOR CAN SPECIFY THE NUMBER OF TIMES A
 2 STUDENT MAY MAKE AN INCORRECT RESPONSE BEFORE BEING GIVEN HELP OR
 3 THE CORRECT ANSWER.

4

5 NORMALLY DRILL AND PRACTICE EXERCISES ARE TIMED. THE TEACHER CAN
 6 SPECIFY THE AMOUNT OF TIME AN INDIVIDUAL STUDENT MAY HAVE FOR
 7 HIS RESPONSE. TO BEST MEET THE NEEDS OF OUR TEACHER EDUCATION
 8 MODULE HERE, I HAVE SELECTED A NON-TIMED MODE FOR YOU.
 9 NOW WE'LL CONTINUE.

QUESTION:

10 $5 + 4 = 1$

CORRECT ANSWER RANGE

11 MIN: 9

11 MAX: 9

REPLY FOR THIS RANGE:

12 FINE!

WRONG ANSWER RANGE:

13 MIN:-1.00000E+00
13 MAX: 1.00000E+30

REPLY FOR THIS RANGE:

14 INCORRECT. TRY AGAIN.

FAILURE MESSAGE:

15 $5 + 4 = 9$

SECTION # 7

QUESTION:

1 $83 + 11 = ?$

CORRECT ANSWER RANGE

2 MIN: 94
2 MAX: 94

REPLY FOR THIS RANGE:

3 BEAUTIFUL!!
4 ~~\$\$\$BRANCH-~~ 12

WRONG ANSWER RANGE:

5 MIN:-1.00000E+00
5 MAX: 1.00000E+30

REPLY FOR THIS RANGE:

6 SORRY. TRY ONE MORE TIME.

FAILURE MESSAGE:

7 NO. $83 + 11 = 94$
8 ~~\$\$\$BRANCH-~~ 12

SECTION # 9

QUESTION:

1 $2 \times 3 = 6$

CORRECT ANSWER RANGE

2 MIN: 6

2 MAX: 6

REPLY FOR THIS RANGE:

3 GREAT!!

WRONG ANSWER RANGE:

4 MIN:-1.00000E+30

4 MAX: 1.00000E+30

REPLY FOR THIS RANGE:

5 SORRY, TRY AGAIN.

FAILURE MESSAGE:

6 NO. $2 \times 3 = 6$

SECTION # 9

QUESTION:

1 $7 \times 9 = 63$

CORRECT ANSWER RANGE

2 MIN: 63

2 MAX: 63

REPLY FOR THIS RANGE:

3 FINE!

WRONG ANSWER RANGE:

4 MIN:-1.00000E+30

4 MAX: 1.00000E+30

REPLY FOR THIS RANGE:

5 NO, TRY AGAIN.

FAILURE MESSAGE:

6 SORRY. $7 \times 9 = 63$

SECTION # 10

TEXT:

- 1 FOR EACH QUESTION THE AUTHOR CAN SPECIFY THE NUMBER OF TIMES A
- 2 STUDENT MAY MAKE AN INCORRECT RESPONSE BEFORE BEING GIVEN HELP OF
- 3 THE CORRECT ANSWER.
- 4
- 5 NORMALLY DRILL AND PRACTICE EXERCISES ARE TIMED. THE TEACHER CAN
- 6 SPECIFY THE AMOUNT OF TIME AN INDIVIDUAL STUDENT MAY HAVE FOR HIS
- 7 RESPONSE. TO BEST MEET THE NEEDS OF OUR TEACHER EDUCATION MODULE
- 8 HERE, I HAVE SELECTED A UNTIMED MODE FOR YOU.
- 9 NOW, WE'LL CONTINUE.

QUESTION:

10 $5 \times 3 = 1$

CORRECT ANSWER RANGE

11 MIN: 15

11 MAX: 15

REPLY FOR THIS RANGE:

12 NICE!!

WRONG ANSWER RANGE:

13 MIN:-1.000000E+00

13 MAX: 1.000000E+00

REPLY FOR THIS RANGE:

14 INCORRECT. TRY AGAIN.

FAILURE MESSAGE:

15 NO. $5 \times 3 = 15$

SECTION # 11

QUESTION:

1 $12 \div 12 = 3$

CORRECT ANSWER RANGE

2 MIN: 144

2 MAX: 144

REPLY FOR THIS RANGE:

3 BEAUTIFUL!!

WRONG ANSWER RANGE:

- 4 MIN:-1.00000E+30
- 4 MAX: 1.00000E+30

REPLY FOR THIS RANGE:

- 5 SORRY. TRY ONE MORE TIME.

FAILURE MESSAGE:

- 6 NO. $12 \times 12 = 144$

SECTION # 12

SECTION OPTIONS:

KEYWORD

- 1 TRIALS = 3

TEXT:

- 2 O.K. WE MADE IT THROUGH ARITHMETIC --- IN A FASHION.
- 3 YOUR SCORE HAS BEEN FILED FOR FUTURE REFERENCE BY THE TEACHER OR
- 4 FOR USE BY THE COMPUTER IN BRANCHING YOU TO INSTRUCTIONAL
- 5 MATERIAL APPROPRIATE FOR YOUR OWN INDIVIDUAL NEEDS. YOUR
- 6 RESPONSES HAVE ALSO BEEN PLACED IN A STATISTICAL FILE FOR ME (THE
- 7 AUTHOR) TO USE WHEN I EVALUATE THE DESIGN OF THE MODULE.
- 8
- 9 NOW, LET'S TRY A DRILL AND PRACTICE LANGUAGE EXERCISE. THE
- 10 COMPUTER WILL TYPE A FRENCH WORD OR PHRASE AND YOU TYPE THE
- 11 ENGLISH EQUIVALENT.

QUESTION:

- 12 MERCI 1

CORRECT ANSWER GROUP

- 13 THANK

REPLY FOR THIS GROUP:

- 14 QUITE RIGHT!

REPLY TO UNEXPECTED ANSWER:

- 15 NOT QUITE, TRY AGAIN.

FAILURE MESSAGE:

- 16 MERCI MEANS -- THANK YOU!

SECTION # 13

SECTION OPTIONS:
KEYWORD

QUESTION:

1 AU REVOIR 1

CORRECT ANSWER GROUP

2 BY

REPLY FOR THIS GROUP:

3 GOOD!

CORRECT ANSWER GROUP

4 SO LONG

REPLY FOR THIS GROUP:

5 GOOD!

REPLY TO UNEXPECTED ANSWER:

6 TRY AGAIN, YOU'RE NOT A FRENCHMAN YET!

FAILURE MESSAGE:

7 AU REVOIR MEANS -- GOODBYE -- BUT WE'RE NOT THROUGH YET.

SECTION # 14

SECTION OPTIONS:
KEYWORD

QUESTION:

1 VIN BLANC 1

CORRECT ANSWER GROUP

2 WINE

REPLY FOR THIS GROUP:

3 OUI. VIN BLANC MEANS WHITE WINE.

4 WHEN I SEE YOU, YOU CAN TREAT ME TO A ROUND!

REPLY TO UNEXPECTED ANSWER:

5 COME ON NOW! WANT AN FRENCHMAN LIKE TO DRINK?

FAILURE MESSAGE:

6 YOU'LL NOT HAVE TO WORRY ABOUT GETTING TYPED IN FRANCE.

7 VIN BLANC MEANS -- WHITE WINE.

SECTION # 15

SECTION OPTIONS:

- 1 TRIALS = 3
KEYWORD

TEXT:

- 2 I DON'T SUPPOSE WE QUALIFY AS FRENCHMEN YET, BUT PERHAPS WE'RE
3 ON THE WAY. AGAIN YOUR PROGRESS HAS BEEN PROPERLY RECORDED. IF
4 A STUDENT MISSES CERTAIN KINDS OF PROBLEMS, THE COMPUTER CAN
5 BRANCH HIM TO EASIER PROBLEMS, PROVIDE HELP, OR REPEAT PROBLEMS
6 WITH WHICH HE HAS HAD DIFFICULTY --- IF THE AUTHOR BUILDS THIS
7 INTO THE INSTRUCTIONAL PROGRAM.
8
9 NOW READ THE WORDS OF RENE DESCARTES AS HE CONTEMPLATED THE
10 COMPUTER: COGITO ERGO SUM.
11 TRANSLATED: 'I THINK THEREFORE I AM'.

QUESTION:

- 12 HOW MANY VERBS ARE THERE IN THE ENGLISH TRANSLATION? 1

CORRECT ANSWER GROUP

- 13 TWO

REPLY FOR THIS GROUP:

- 14 FINE!

CORRECT ANSWER GROUP

- 15 2

REPLY FOR THIS GROUP:

- 16 FINE!

REPLY TO UNEXPECTED ANSWER:

- 17 NO. YOU'D BETTER LOOK AGAIN.

SECTION # 16

SECTION OPTIONS:

KEYWORD

QUESTION:

- 1 TYPE A SENTENCE USING ONE OF THOSE TWO VERBS.

CORRECT ANSWER GROUP

- 2 *THINK*

REPLY FOR THIS GROUP:

3 O.K., I'LL ACCEPT THATS YOU DID SPELL 'THINK' PROPERLY.

CORRECT ANSWER GROUP:

4 SAYS

REPLY FOR THIS GROUP:

5 O.K., I'LL ACCEPT THATS YOU DID SPELL 'AM' PROPERLY.

REPLY TO UNEXPECTED ANSWER:

6 PLEASE REFORMULATE! YOU CAN DO BETTER THAN THAT. I'LL GIVE YOU

7 ONE MORE CHANCE TO TYPE THE SENTENCE AND VERB CORRECTLY.

FAILURE MESSAGE:

8 THE VERBS WERE 'THINK' AND 'AM'. YOU NEED TO PRACTICE YOUR

9 TYPING SKILL.

SECTION 4 17

SECTION OPTIONS:

KEYWORD

1 THREE = 3

QUESTION:

2 WHAT IS THE TENSE OF THOSE VERBS? 1

CORRECT ANSWER GROUP:

3 REPRESENTS

REPLY FOR THIS GROUP:

4 CERTAINLY!

WRONG ANSWER GROUP:

5 PAST

REPLY FOR THIS GROUP:

6 COME ON NOW. THESE VERBS SHOW ACTION NOW. TRY ANOTHER TENSE.

WRONG ANSWER GROUP:

7 FUTURE

REPLY FOR THIS GROUP:

8 THESE VERBS WON'T BECOME ACTION THAT IS GOING TO HAPPEN.

9 THE ACTION IS NOW. TRY ANOTHER TENSE.

REPLY TO UNEXPECTED ANSWER:

10 YOU CAN DO BETTER THAN THAT. TRY: PAST, PRESENTS OR FUTURE.

FAILURE MESSAGE:

11 THE VERBS ARE IN THE PRESENT TENSE. PLEASE YOU'D BETTER

12 YOUR TYPING SKILL.

SECTION # 18

TEXT:

1 YOU MAY HAVE NOTED THAT THE QUOTATION FROM DEICORTEZ WAS
 2 STATED IN A MISLEADING CONTEXT. IF THE HUMAN AUTHOR PROVIDES
 3 INCORRECT INFORMATION, THE TUTORIAL PROGRAM WILL PASS IT ALONG
 4 TO STUDENTS. A WRITTEN PROGRAM SHOULD, OF COURSE, BE REVIEWED
 5 AND IMPROVED WITH TIME.
 6
 7 ONE OF THE NICEST COMPUTER APPLICATIONS IN LEARNING IS THE
 8 SIMULATION OF REAL WORLD EVENTS. IN A SIMULATION THE
 9 STUDENT MANIPULATES CERTAIN VARIABLES AND OBSERVES THE EFFECTS ON
 10 THOSE VARIABLES ON THE SYSTEM UNDER STUDY. HERE NOW IS A SHORT
 11 SIMULATION WRITTEN IN BASIC.

12 *****POP1

SECTION # 19

SECTION OPTIONS:

1 TRIALS = 2

TEXT:

2 BY INTERACTING WITH CERTAIN SIMULATED MODELS, STUDENTS MAY GAIN
 3 IMPORTANT EXPERIENCE MORE QUICKLY THAN THROUGH OTHER INSTRUCTI-
 4 ONAL TECHNIQUES. THIS SIMULATION COULD HAVE BEEN DONE THROUGH
 5 HAND READING THE STUDENT TO CHANGE ADDITIONAL VARIABLES. SUCH A
 6 BIRTH RATE, DEATH RATE, MIGRATION RATES, ... GRAPHIC OR TABLE
 7 DISPLAYS MIGHT ALSO HAVE BEEN APPROPRIATE.

8
 9 THE UNDERSTANDING OF GRAPHIC RELATIONSHIPS CAN BE ENHANCED BY
 10 COMPUTER DIALOG INVOLVING THE STUDENT IN THE INTERPRETATION OF
 11 GRAPHS. HERE IS A SAMPLE GRAPH OF SOME DATA:

12 ***

13	1900 +	0																		
14	1940 +	2																		
15	YEAR 1950 +	4																		
16	1960 +	6																		
17	1970 +	8																		
18			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
19			0	1	2	3	4	5	6	7	8									
20	U.S. ELECTRICAL ENERGY CONSUMPTION PER CAPITA																			
21	KILOWATT HRS. PER YEAR																			

QUESTION:

22 READ FROM THE GRAPH THE PER CAPITA CONSUMPTION IN 1950. WHAT
 23 VALUE DO YOU ESTIMATE IN KILOWATT HRS. PER YEAR?

CORRECT ANSWER RANGE

24 MIN: 1500
24 MAX: 1900

REPLY FOR THIS RANGE:

25 O.K. I'LL ACCEPT THAT: I READ APPROXIMATELY 1700.

WRONG ANSWER RANGE:

26 MIN: 1.5
26 MAX: 1.9

REPLY FOR THIS RANGE:

27 ENERGY UNITS ARE 1000 KW-HRS/YEAR. MULTIPLY YOUR ANSWER BY 1000. %

WRONG ANSWER RANGE:

28 MIN:-1.00000E+00
28 MAX: 1.00000E+00

REPLY FOR THIS RANGE:

29 NO, TRY ONE MORE TIME. %

FAILURE MESSAGE:

30 I READ APPROXIMATELY 1700 KW-HRS PER PERSON IN 1945.

SECTION # 20

SECTION OPTIONS:

1 TRIALS = 2

QUESTION:

- 2 IF PER CAPITA CONSUMPTION CONTINUES TO GROW AT THE SAME RATE
- 3 AS IN RECENT DECADES, PREDICT THE VALUE FOR 1990. %

CORRECT ANSWER RANGE

4 MIN: 14000
4 MAX: 17000

REPLY FOR THIS RANGE:

- 5 BASED ON THE LIMITED DATA SHOWN HERE, THAT'S A REASONABLE
- 6 PREDICTION.

WRONG ANSWER RANGE:

- 7 MIN:-1.00000E+00
- 7 MAX: 1.00000E+00

REPLY FOR THIS RANGE:

- 8 NOTE THAT ENERGY CONSUMPTION HAS ALMOST DOUBLED IN EACH DECADE.
- 9 TRY ONE MORE TIME. 1

FAILURE MESSAGE:

- 10 THE DATA SHOWN ARE LIMITED, BUT IT SEEMS TO ME THAT THE GRAPH
- 11 PREDICTS CLOSER TO 15,000 KW-HRS PER YEAR -- OF HAS YOUR CURSOR
- 12 SCROLLED OFF THE TOP OF THE VIDEO TERMINAL ALREADY...

SECTION # 21

SECTION OPTIONS:

- 1 TRIALS = 1

TEXT:

- 2 IF YOU ARE USING A VIDEO TERMINAL YOU ARE NOW OBSERVING ONE
- 3 OF THEIR MOST SEVERE LIMITATIONS. THE SCREEN DISPLAYS ONLY
- 4 TWENTY LINES OF TYPE, AND THE NUMBER OF QUESTIONS I CAN ASK ABOUT
- 5 ANY GIVEN VIDEO DISPLAY IS SEVERELY LIMITED. (ON THE OTHER HAND,
- 6 VIDEO TERMINALS ARE NORMALLY FASTER, QUIETER, AND EASIER TO READ
- 7 THAN CONTEMPORARY TELETYPEWRITER TERMINALS. THIS PARTICULAR
- 8 GRAPH COULD HAVE BEEN DUPLICATED AND DISTRIBUTED TO STUDENTS
- 9 BEFORE THEY SIGNED ON THE COMPUTER FOR THIS LESSON.
- 10

QUESTION:

- 11 CAN MAN BECOME A VICTIM OF HIS OWN TECHNOLOGY?

CORRECT ANSWER GROUP

- 12 YES

WRONG ANSWER GROUP:

- 13 NO

SECTION # 22

SECTION OPTIONS:

1 TRIALS = 1

QUESTION:

2 CAN SCHOOLS HAVE A ROLE IN HELPING MEN MASTER TECHNOLOGY?

CORRECT ANSWER GROUP

3 YES

WRONG ANSWER GROUP:

4 NO

SECTION # 23

SECTION OPTIONS:

1 TRIALS = 1

TEXT:

- 2 ONE OF THE BYPRODUCTS OF COMPUTER USE IN EDUCATION IS THAT
- 2 STUDENTS MAY WELL DEVELOP A PERCEPTION OF THE POTENTIAL AND
- 4 LIMITATIONS OF OTHER COMPUTER APPLICATIONS IN SOCIETY.

QUESTION:

5 HAVE YOU OBSERVED ANY PROBLEMS OR LIMITATIONS IN THIS MODULE?

CORRECT ANSWER GROUP

6 YES

BEST COPY AVAIL.

SECTION # 24

TEXT:

- 1 IN SPITE OF ITS ASSETS, THERE CERTAINLY ARE LIMITATIONS IN THE
- 2 COMPUTER'S ABILITY TO DEAL WITH INDIVIDUAL STUDENT PROBLEMS IN
- 3 LEARNING, AND STUDENTS RECOGNIZE THIS READILY.
- 4
- 5 AS A RESULT OF INITIAL ENCOUNTERS WITH COMPUTERS SOME STUDENTS
- 6 WILL WANT TO LEARN MORE ABOUT THEM, AND THEY SHOULD BE
- 7 ENCOURAGED TO DO SO. STUDENTS WHO HAVE LEARNED A SYMBOLIC
- 8 PROGRAMMING LANGUAGE ARE IN A FAR BETTER POSITION TO WORK
- 9 WITH REALISTIC PROBLEMS THAN ARE THEIR CLASSMATES.
- 10 HERE FOR EXAMPLE, IS A PROGRAM WRITTEN IN BASIC BY ONE OF MY
- 11 FORMER HIGH SCHOOL STUDENTS IN SUPPORT OF A HIGH SCHOOL COURSE
- 12 IN MATHEMATICS:

13 ****DICE

SECTION # 25

SECTION OPTIONS:

KEYWORD

- 1 TRIALS = 15

TEXT:

- 2 THIS STUDENT-AUTHORED PROGRAM ALLOWED THE STUDENT AND HIS CLASS-
- 3 MATES TO SIMULATE QUANTITIES OF DATA BASED UPON THE GENERATION OF
- 4 RANDOM NUMBERS WITHIN THE COMPUTER. THEY WOULD NEVER HAVE HAD
- 5 TIME TO HANDLE SUCH DATA IN CLASS WITHOUT COMPUTER AID.
- 6 FURTHERMORE, THE MATHEMATICAL CONCEPTS INVOLVED HAD TO BE
- 7 LOGICALLY ORGANIZED TO WRITE A PROGRAM THAT WOULD WORK FREQUENTLY.
- 8
- 9 OTHER STUDENTS HAVE WRITTEN EFFECTIVE PROGRAMS TO PRODUCE AND
- 10 EVALUATE DATA COLLECTED FROM THE COMMUNITY, FROM THEIR
- 11 CLASSMATES, AND FROM LAB EXPERIMENTS.

QUESTION:

- 12 YOU'VE JUST WORKING WITH THE DOUBLE FOR LOOPS. ONE TIME MORE?
- 13 AS AUTHOR I'D APPRECIATE ANY COMMENTS YOU'D CARE TO MAKE
- 14 REGARDING IT. PLEASE TELL YOUR COMMENTS NOW; INDICATE THE
- 15 COMPLETION OF YOUR MESSAGE BY TYPING TWO ASTERISKS: **

CORRECT ANSWER GROUP

- 16 **

SECTION # 26

TEXT:

1 THIS MODULE HAS BEEN WRITTEN IN A SPECIAL LANGUAGE FOR AUTHORS
 2 OF DIALOGS; IT'S CALLED "INTERACTIVE DIALOGUE FACILITY" (IDEF).
 3 SOME OF THE POWER OF IDEF HAS NOT BEEN DEMONSTRATED IN THIS SHORT
 4 LESSON, BUT I DO ENCOURAGE YOU TO LOOK FURTHER FOR POTENTIAL
 5 APPLICATIONS WHICH WILL EFFECTIVELY SUPPLEMENT YOUR OWN TEACHING.
 6 IDEF MANUALS ARE AVAILABLE WHICH ARE EASY TO UNDERSTAND.
 7
 8 0000
 9 0000
 10 0000
 11 0000
 12 0000
 13 0000
 14 NOW THAT YOU'VE HAD OCCASION TO WORK WITH THIS MODULE ---
 15 0000

QUESTION:

16 DO YOU PERSONALLY BELIEVE THAT COMPUTERS CAN PLAY AN EFFECTIVE
 17 ROLE IN YOUR OWN CLASSROOM OR SCHOOL IN THE FORESEEABLE FUTURE?
 18 PLEASE RESPOND BY TYPING THE FOLLOWING CODE:
 19 1. COMPUTERS CAN PLAY A VERY IMPORTANT ROLE IN THE FORESEEABLE
 20 FUTURE.
 21 0000
 22 2. COMPUTERS CAN PLAY AN IMPORTANT ROLE IN THE FORESEEABLE FUTURE.
 23 0 1 IS NOT SURE.
 24 4. COMPUTERS CANNOT PLAY AN IMPORTANT ROLE IN THE FORESEEABLE
 25 FUTURE.
 26 5. COMPUTERS CAN IN NO WAY PLAY AN IMPORTANT ROLE IN THE
 27 FORESEEABLE FUTURE.

CORRECT ANSWER RANGE:

28 MIN: 1
 28 MAX: 5

REPLY FOR THIS RANGE:

29 THANKS; IT'S BEEN NICE WORKING WITH YOU.
 30 AU REVOIR FOR NOW ... DAS IST ALLES FÜR HEUTE.

WRONG ANSWER RANGE:

31 MIN: 1.00000E+00
 31 MAX: 1.00000E+00

REPLY FOR THIS RANGE:

32 PLEASE INDICATE YOUR FEELINGS BY TYPING 1,2,3,4, OR 5.

FAILURE MESSAGE:

33 AU REVOIR

NO BRANCHING SPECIFIED

COMMAND? XSTOP

DONE

BYE

015 MINUTES OF TERMINAL TIME

,]

GET-DICE

LIS
DICE

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10 REM PROGRAM AUTHORS: V. LUNETTA; P. ROBBINS
20 DIM A$(25)
30 PRINT "THIS PROGRAM SIMULATES THE RANDOM POLLING OF A PAIR"
40 PRINT "OF DICE AND RECORDS HOW MANY TIMES EACH NUMBER (2-12)"
50 PRINT "APPEARED."
55 PRINT "THIS COMPUTER WILL TAKE APPROXIMATELY 10 SEC. TO CALCULATE"
56 PRINT "EACH 1000 POLLS --"
60 PRINT "HOW MANY POLLS DO YOU WANT ME TO SIMULATE?";
70 LET A=B=C=D=E=F=G=H=I=J=K=0
80 INPUT Z
90 IF Z<500 THEN 120
91 IF Z<18000 THEN 100
92 PRINT "WITH "Z;" POLLS YOU'D HAVE TO WAIT MORE THAN THREE MINUTES FOR THE"
93 PRINT "COMPUTER TO RESPOND. I'M GOING TO ASK YOU TO TYPE A NUMBER LESS"
94 PRINT "THAN 18000."
95 GOTO 60
100 PRINT "THIS COMPUTER TAKES ABOUT 10 SEC. TO CALCULATE EACH 1000 POLLS --"
110 PRINT "SO YOU'LL HAVE TO WAIT APPROXIMATELY";INT((Z/1000)+10);"SECONDS FOR"
    RESPOND."
120 DEF FNA(M)=INT(M/L*1000)/10
130 DEF FNB(N)=INT(N/36*1000)/10
140 LET P=Q=1
150 FOR M=1 TO Z
160 LET X=INT(S+RND(P)+1)+INT(6+RND(Q)+1)
170 IF X>2 THEN 200
180 LET A=A+1
190 GOTO 480
200 IF X>3 THEN 230
210 LET B=B+1
220 GOTO 480
230 IF X>4 THEN 260
240 LET C=C+1
250 GOTO 480
260 IF X>5 THEN 290
270 LET D=D+1
280 GOTO 480
290 IF X>6 THEN 320
300 LET E=E+1
310 GOTO 480
320 IF X>7 THEN 350
330 LET F=F+1
340 GOTO 480
350 IF X>8 THEN 380
360 LET G=G+1
370 GOTO 480
380 IF X>9 THEN 410
390 LET H=H+1
400 GOTO 480
410 IF X>10 THEN 440
420 LET I=I+1
430 GOTO 480

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440 IF X>11 THEN 470
450 LET J=J+1
460 GOTO 480
470 LET K=K+1
480 NEXT W
490 LET L=Z
500 PRINT
510 PRINT
520 PRINT TAB(5);"DICE","NO. OF","REAL %    IDEAL DISTRIBUTION"
530 PRINT TAB(5);"SUM","ROLLS","OF";Z;"    % OF";Z
540 PRINT TAB(6);"2",A,FNA(A),FNB(1)
550 PRINT TAB(6);"3",B,FNA(B),FNB(2)
560 PRINT TAB(6);"4",C,FNA(C),FNB(3)
570 PRINT TAB(6);"5",D,FNA(D),FNB(4)
580 PRINT TAB(6);"6",E,FNA(E),FNB(5)
590 PRINT TAB(6);"7",F,FNA(F),FNB(6)
600 PRINT TAB(6);"8",G,FNA(G),FNB(5)
610 PRINT TAB(6);"9",H,FNA(H),FNB(4)
620 PRINT TAB(6);"10",I,FNA(I),FNB(3)
630 PRINT TAB(6);"11",J,FNA(J),FNB(2)
640 PRINT TAB(6);"12",K,FNA(K),FNB(1)
650 PRINT "Do YOU WANT TO ROLL THE DICE AGAIN";
660 INPUT A$
670 IF A$="YES" THEN 60
680 IF A$="yes" THEN 60
690 IF A$="NO" THEN 730
700 IF A$="no" THEN 730
710 PRINT "I DIDN'T UNDERSTAND YOU. PLEASE TYPE 'YES' OR 'NO'."
720 GOTO 660
730 CHAIN "$IDSF"
740 END

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GET-PDP1
LIS
PDP1
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10 REM AUTHORS: V. LUHETTA; E. BROWN
20 REM THIS PROGRAM USES COMPOUND INTEREST METHOD TO PREDICT FUTURE POPULATION
30 DIM A$(5)
40 PRINT "THIS PROGRAM SIMULATES POPULATION GROWTH. THROUGH IT YOU"
50 PRINT "WILL DETERMINE THE POPULATION OF THE UNITED STATES AT SOME"
60 PRINT "FUTURE YEAR."
70 PRINT "IN 1970 THE POPULATION OF THE UNITED STATES WAS 203.8 MILLION PEOPLE."

80 PRINT "AT THAT TIME THE ANNUAL GROWTH RATE WAS 1.1%."
90 PRINT "WHAT ANNUAL GROWTH RATE WOULD YOU LIKE TO STUDY IN THIS?"
100 PRINT "SIMULATION (EXPRESS AS A %; DO NOT TYPE THE % SIGN)";
110 INPUT R
120 PRINT "BASED ON THE 1970 POPULATION AND AN ANNUAL GROWTH RATE OF"
130 PRINT R;"%", AT WHAT FUTURE YEAR WOULD YOU LIKE ME TO PREDICT"
140 PRINT "THE POPULATION OF THE UNITED STATES";
150 INPUT Y9
151 IF Y9<10000 THEN 160
152 PRINT "THE COMPUTER WILL TAKE A LONG WHILE TO MAKE THIS PREDICTION."
153 PRINT "I DON'T WANT YOU TO WAIT THAT LONG. PLEASE TYPE IN A SMALLER YEAR."

154 GOTO 150
160 IF Y9>1969 THEN 200
170 PRINT "YOU DID NOT TYPE A FULL YEAR LATER THAN 1970. PLEASE RETYPE"
180 PRINT "THE YEAR. FOR EXAMPLE -- 1984, 2000..."
190 GOTO 150
200 P=203.8
210 FOR Y=1970 TO Y9-1
220 P=P*(1+(R/100))
230 NEXT Y
240 PRINT "IN "Y9;"THE U.S. POPULATION WILL BE";INT(P);"MILLION."
250 IF P<1.E+06 THEN 280
260 PRINT "THE E NOTATION ABOVE SHOWS THE POPULATION IN EXPONENTIAL"
270 PRINT "FORM SINCE IT IS IN EXCESS OF 1,000,000 MILLION."
280 PRINT "WOULD YOU LIKE TO LOOK AT THE POPULATION IN ANOTHER"
290 PRINT "YEAR";
300 INPUT A$
310 IF A$="YES" THEN 90
320 IF A$="yes" THEN 90
330 IF A$="NO" THEN 370
340 IF A$="no" THEN 370
350 PRINT "PLEASE TYPE 'YES' OR 'NO'; I DIDN'T UNDERSTAND YOU."
360 GOTO 300
370 CHAIN "$IDSF"
380 END
```

LESSON NAME = TRACH4

VERSION NUMBER 31

CURRENT LESSON OPTIONS

ANSWER TYPE = STRING
NO TIMEOUTS TO BE USED

ALLOW DEMO? YES
AUTO-UPSHIFT? YES
REMOVE BLANKS? YES
ALLOW //TSB? NO
ALLOW //CALC? NO
ALLOW //GOTO? YES
AUTOMATIC QUESTION NUMBERS? NO
REDISPLAY? NO
TRIALS = 3
RESPONSE FILENAME= RESP4
STATISTICS FILENAME= STAT4
TIME = 60

SECTION # 1

SECTION OPTIONS:
KEYWORD

TEXT:

- 1 HELLO!! WELCOME TO TEACHER EDUCATION MODULE #4.
- 2
- 3 THE PURPOSE OF THIS MODULE IS TO DISCUSS IMPLEMENTATION OF
- 4 COMPUTER-BASED MODULES WITHIN A PUBLIC SCHOOL
- 5 ENVIRONMENT.

QUESTION:

- 6 HAVE YOU COMPLETED TEACHER EDUCATION MODULE #1
- 7 ENTITLED TEACH ? \$

CORRECT ANSWER GROUP

8 #YES#

65

REPLY FOR THIS GROUP:

9 FINE.

WRONG ANSWER GROUP:

10 #NO#

REPLY FOR THIS GROUP:

11 I SUGGEST THAT YOU DO COMPLETE MODULE #1 BEFORE PROCEEDING WITH
12 THIS MODULE. MODULE #1 IS DESIGNED TO INTRODUCE TEACHERS TO
13 COMPUTER APPLICATIONS IN EDUCATION, AND AN UNDERSTANDING OF THOSE
14 APPLICATIONS IS PREREQUISITE TO DEALING EFFECTIVELY WITH PROBLEMS
15 OF IMPLEMENTATION. TEACHER EDUCATION MODULES #2 AND #3 ARE
16 RELEVANT BUT NOT PREREQUISITE TO PROCEEDING. THEY DEAL
17 WITH MODULE SELECTION CRITERIA AND WITH MODULE DESIGN.
18 THE COURSE NAME OF MODULE #1 IS TEACH.
19 \$\$\$BRANCH- 91

REPLY TO UNEXPECTED ANSWER:

20 PLEASE TYPE 'YES' OR 'NO'. I DIDN'T UNDERSTAND YOUR RESPONSE.

SECTION # 2

SECTION OPTIONS:

KEYWORD

QUESTION:

1 DO YOU ALREADY HAVE ONE OR MORE COMPUTER-BASED MODULES YOU PLAN
2 TO USE WITH YOUR STUDENTS?

CORRECT ANSWER GROUP

3 #YES#

REPLY FOR THIS GROUP:

4 O.K. YOU'RE OFF TO A DECENT START!

WRONG ANSWER GROUP:

5 #NO#

REPLY FOR THIS GROUP:

6 TEACHER EDUCATION MODULES #2 AND #3 DEAL WITH THE SELECTION
7 OF MODULES AND WITH MODULE DESIGN. YOU MAY FIND THEM TO
8 BE HELPFUL WHEN YOU ATTEMPT TO SECURE APPROPRIATE SOFTWARE.
9 \$\$\$BRANCH- 3

REPLY TO UNEXPECTED ANSWER:

10 PLEASE TYPE 'YES' OR 'NO'. I DIDN'T UNDERSTAND YOUR RESPONSE.

SECTION # 3

TEXT:

- 1 IN RECENT YEARS MANY TEACHERS HAVE BEEN ABLE TO MOVE TOWARD
- 2 TEACHING STRATEGIES FOSTERING INDIVIDUALIZED LEARNING.
- 3 PROPONENTS OF INDIVIDUALIZATION BELIEVE THAT PEOPLE LEARN BEST IN
- 4 THEIR OWN UNIQUE WAYS AND AT DIFFERENT RATES. LEARNERS
- 5 VARY IN EXPERIENCE, ABILITY, AND MOTIVATION; THEY DIFFER IN THE
- 6 LENGTH OF TIME THEY NEED TO MASTER SPECIFIC CONCEPTS.
- 7
- 8 IN SOME CONTEMPORARY PROGRAMS THE STUDENT FOLLOWS A CORE SEQUENCE
- 9 OF MATERIAL AT HIS OWN PACE AND PURSUES EXCURSIONS
- 10 PARTICULARLY RELEVANT TO HIS OWN INTERESTS AND NEEDS. HIS
- 11 PROGRESS IS EVALUATED AT REGULAR INTERVALS, AND WITH THE
- 12 TEACHER'S ASSISTANCE, RESPONSIBILITY IS GENERALLY PLACED ON THE
- 13 STUDENT'S SHOULDERS TO PLAN AND IMPLEMENT HIS OWN PROGRAM OF
- 14 STUDIES.

QUESTION:

- 15 IS YOUR CURRENT TEACHING ENVIRONMENT (1) HIGHLY INDIVIDUALIZED,
- 16 LIKE THE ONE DESCRIBED ABOVE, (2) MODERATELY INDIVIDUALIZED,
- 17 OR (3) GROUP-PACED, I.E., TRADITIONAL? \$

CORRECT ANSWER RANGE

- 18 MIN: 1
- 18 MAX: 2

REPLY FOR THIS RANGE:

- 19 INTEGRATING COMPUTER BASED MODULES AS AN ADDITIONAL RESOURCE
- 20 WITHIN AN INDIVIDUALIZED ENVIRONMENT SHOULD PROVE TO BE
- 21 RELATIVELY EASY. STUDENTS WILL ACCESS THEIR MODULES AT
- 22 DIFFERING TIMES DEPENDENT UPON THEIR OWN NEEDS AND PACE. FOR
- 23 THAT REASON THE SCHEDULING OF COMPUTER TIME SHOULD BE QUITE
- 24 MANAGEABLE. THE SELF-PACED LEARNING STYLE STUDENTS HAVE UTILIZED
- 25 WITHIN THE COURSE WILL NOT HAVE TO BE MODIFIED SIGNIFICANTLY
- 26 DURING INTERACTION WITH THE COMPUTER-BASED MODULES.

WRONG ANSWER RANGE:

- 27 MIN: 3
- 27 MAX: 3

REPLY FOR THIS RANGE:

28 EVEN IN A 'GROUP-PACED' CLASSROOM, INDIVIDUALIZED, COMPUTER-
 29 BASED MODULES CAN PLAY AN EFFECTIVE SUPPORTING ROLE. THERE
 30 ARE, OF COURSE, REAL PROBLEMS IN SCHEDULING COMPUTER TIME WHEN A
 31 LIMITED NUMBER OF TERMINALS ARE AVAILABLE SINCE ALL STUDENTS WILL
 32 HAVE TO WORK THROUGH ONE OR MORE MODULES IN A LIMITED PERIOD OF
 33 TIME. THE PROBLEMS ARE MANAGEABLE, HOWEVER. STUDENTS MAY BE
 34 BROUGHT THROUGH THE ACTIVITIES AND SKILLS WHICH ARE PREREQUISITE
 35 TO THE COMPUTER-BASED UNIT PRIOR TO ASSIGNING THE MODULE.
 36 DURING THE PERIOD OF TIME ALLOTTED FOR STUDENTS TO WORK THROUGH
 37 THE MODULES, THE CLASS MAY OPERATE IN AN 'INDEPENDENT STUDY'
 38 MODE WITH FORMAL CLASS SESSIONS SUSPENDED OR CLASS MEETINGS COULD
 39 BE BASED UPON ACTIVITIES NOT DIRECTLY DEPENDENT UPON THE
 40 COMPUTER-BASED MATERIALS.
 41 \$BRANCH- 4

WRONG ANSWER RANGE:

42 MIN:-1.00000E+30
 42 MAX: 1.00000E+30

REPLY FOR THIS RANGE:

43 PLEASE TYPE 1,2, OR 3.

SECTION # 4

SECTION OPTIONS:

KEYWORD

QUESTION:

- 1 KNOWING WHAT YOU ALREADY DO ABOUT COMPUTER-BASED MODULES, WOULD
- 2 YOU CLASS THEM GENERALLY AS EXAMPLES OF GROUP-PACED OR
- 3 INDIVIDUALIZED INSTRUCTION?

CORRECT ANSWER GROUP

4 INDIVID

REPLY FOR THIS GROUP:

- 5 I AGREE. SOME OF THE COMPUTER MODULES I'VE SEEN, THOUGH, HAVE
- 6 BEEN RATHER POOR EXAMPLES OF INDIVIDUALIZATION WITH LITTLE OR NO
- 7 BRANCHING FOR INDIVIDUAL STUDENT DIFFERENCES.
- 8 HOPEFULLY, THE MODULES YOU CONSTRUCT WILL PROVIDE EFFECTIVELY
- 9 FOR INDIVIDUAL DIFFERENCES.

WRONG ANSWER GROUP:

10 GROUP

REPLY FOR THIS GROUP:

11 MY EXPERIENCES DON'T COINCIDE WITH YOURS. ALTHOUGH SOME OF THE
12 MODULES I'VE SEEN HAVE BEEN POOR EXAMPLES OF INDIVIDUALIZATION
13 WITH LITTLE OR NO BRANCHING FOR STUDENT DIFFERENCES, THE
14 MODULES I HOPE TO SELECT FOR MY CLASSES WILL EFFECTIVELY
15 PROVIDE FOR INDIVIDUAL DIFFERENCES.
16 ~~\$\$\$~~BRANCH- 5

REPLY TO UNEXPECTED ANSWER:

17 PLEASE TYPE INDIVIDUAL OR GROUP .. I DIDN'T UNDERSTAND.

SECTION # 5

TEXT:

1 STUDENTS MOVING THROUGH INDIVIDUALIZED COMPUTER-BASED MODULES
2 WILL DO SO AT DIFFERENT RATES WHETHER OR NOT THE COURSE IN WHICH
3 THEY ARE ENROLLED IS SELF-PACED. WHEN STUDENTS ARE WORKING WITH
4 COMPUTER MODULES THE TEACHER'S ROLE SHOULD BE DIFFERENT THAN
5 IT IS IN A MORE CONVENTIONAL GROUP-PACED ENVIRONMENT. THE
6 TEACHER'S ROLE IS THAT OF TUTOR OR GUIDE. WHILE THE STUDENTS
7 INTERACT WITH THE INSTRUCTIONAL PROGRAM, THE TEACHER SPENDS HIS
8 TIME WORKING WITH STUDENTS ON AN INDIVIDUAL BASIS GIVING
9 ATTENTION TO STUDENTS WHO HAVE SPECIAL PROBLEMS.

QUESTION:

10 DO YOUR CURRENT TEACHING STRATEGIES ALLOW YOU TO SPEND
11 (1) A LARGE AMOUNT OF CLASS TIME,
12 (2) A MODERATE AMOUNT OF CLASS TIME,
13 (3) A MINIMAL AMOUNT OF CLASS TIME
14 IN DEALING WITH THE CONCEPTUAL PROBLEMS OF STUDENTS ON AN
15 INDIVIDUAL BASIS.

CORRECT ANSWER RANGE

16 MIN: 1
16 MAX: 2

REPLY FOR THIS RANGE:

17 GOOD! THE USE OF A NUMBER OF WELL-DESIGNED, COMPUTER-BASED
18 MODULES SHOULD HELP YOU TO CONTINUE OR EVEN TO IMPROVE THIS
19 ORIENTATION. WITH ASSISTANCE FROM A COMPUTER YOU MAY BE ABLE
20 TO EXPEND YOUR ENERGIES AT MORE PRODUCTIVE WORK WITH
21 INDIVIDUAL STUDENTS.

WRONG ANSWER RANGE:

22 MIN: 3
22 MAX: 3

REPLY FOR THIS RANGE:

23 WHEN YOUR STUDENTS USE A NUMBER OF WELL DESIGNED, COMPUTER-BASED
24 MODULES IN PLACE OF CONVENTIONAL CLASS ACTIVITY, YOU SHOULD BE
25 FREED TO SPEND MORE TIME WITH STUDENTS HAVING SPECIAL PROBLEMS.
26 \$BRANCH- 6

WRONG ANSWER RANGE:

27 MIN:-1.00000E+30
27 MAX: 1.00000E+30

REPLY FOR THIS RANGE:

28 PLEASE TYPE: 1, 2, OR 3.

SECTION # 6

SECTION OPTIONS:

KEYWORD

TEXT:

1 WELL WRITTEN COMPUTER MODULES MAY TERMINATE EARLY FOR STUDENTS
2 HAVING DIFFICULTY WITH SPECIFIC CONCEPTS AND DIRECT THE STUDENT
3 TO CONSULT HIS TEACHER BEFORE PROCEEDING. THESE STUDENTS WILL
4 HAVE EXHAUSTED THE COMPUTER HELP MESSAGES OR EXCEEDED A CERTAIN
5 ERROR RATE.
6 A NON-THREATENING ATTITUDE SHOULD EXIST SUCH THAT STUDENTS WHOSE
7 MODULES HAVE BEEN TERMINATED DUE TO POOR UNDERSTANDING OF A
8 CONCEPT READILY COME FOR CONSULTATION WITH THEIR TEACHER. DURING
9 DISCUSSION THE TEACHER MAY WELL PROVIDE REMEDIAL ASSISTANCE TO
10 THE STUDENT AND THEN SUGGEST A NEW STARTING POINT FOR HIM IN AN
11 APPROPRIATE MODULE.

QUESTION:

12 DO YOU FEEL YOU ARE CURRENTLY UTILIZING AN APPROPRIATE SYSTEM FOR
13 THE EVALUATION OF STUDENT PROGRESS IN YOUR TEACHING?

CORRECT ANSWER GROUP

14 #NO#

REPLY FOR THIS GROUP:

15 WELCOME TO THE CLUB!! THERE CERTAINLY ARE A LOT OF POORLY
16 DEFINED ISSUES AND CRITERIA IN STUDENT EVALUATION TODAY.

WRONG ANSWER GROUP:

17 #YES#
 18 000
 19 000
 20 000
 21 000

REPLY FOR THIS GROUP:

22 THAT MAY BE, BUT I'M NOT CONVINCED THAT CONTEMPORARY EVALUATION
 23 SYSTEMS ARE ESPECIALLY RELIABLE. THERE CERTAINLY ARE A LOT OF
 24 POORLY DEFINED ISSUES AND CRITERIA IN STUDENT EVALUATION TODAY.
 25 \$1BRANCH- 7

REPLY TO UNEXPECTED ANSWER:

26 PLEASE TYPE: YES OR NO.

SECTION # 7

TEXT:

1 WELL DESIGNED INSTRUCTIONAL PROGRAMS SHOULD END WITH OPEN-ENDED
 2 PERHAPS EVEN DIVERGENT ASSIGNMENTS FOR STUDENTS WHERE
 3 APPROPRIATE. THE STUDENT SHOULD BE ASKED TO PURSUE THE IDEAS
 4 DEVELOPED IN THE MODULE BEYOND THE CONSTRAINTS OF THE COMPUTER
 5 TERMINAL ENVIRONMENT. IN A LABORATORY SIMULATION, FOR EXAMPLE,
 6 HE SHOULD LIST SOURCES OF EXPERIMENTAL ERROR AS HE ENVISIONS
 7 THEN, HE SHOULD CRITIQUE THE LIMITATIONS OF THE SIMULATION,
 8 AND HE SHOULD CONTINUE TO INVESTIGATE THE PHENOMENA THAT WERE
 9 SIMULATED.

QUESTION:

10 HOW MANY COMPUTER TERMINALS ARE TO BE AVAILABLE IN YOUR SCHOOL
 11 THIS YEAR?

CORRECT ANSWER RANGE

12 MIN: 0
 12 MAX: 0

REPLY FOR THIS RANGE:

13 THIS DISCUSSION IS OBVIOUSLY ACADEMIC UNTIL YOUR STUDENTS DO
 14 HAVE ACCESS TO A TERMINAL. STUDENTS CAN GET LIMITED AMOUNTS OF
 15 TERMINAL TIME FROM PUBLIC SPIRITED CORPORATIONS IN YOUR
 16 COMMUNITY, BUT PROBABLY TIME WILL NOT BE SUFFICIENT TO PERMIT
 17 THE USE OF INSTRUCTIONAL MODULES WITH NUMBERS OF STUDENTS.

CORRECT ANSWER RANGE

18 MIN: 1
 18 MAX: 2

REPLY FOR THIS RANGE:

- 19 YOU ARE DESTINED TO ENCOUNTER COMPLICATIONS IN THE SCHEDULING
- 20 OF COMPUTER TIME WHEN YOU WANT NUMBERS OF STUDENTS TO BE INVOLVED
- 21 IN COMPUTER USE.

CORRECT ANSWER RANGE

- 22 MIN: 3
- 22 MAX: 8

REPLY FOR THIS RANGE:

- 23 YOU WILL ENCOUNTER SOME COMPLICATIONS IN SCHEDULING COMPUTER TIME
- 24 WHEN LARGE NUMBERS OF STUDENTS ARE TO BE INVOLVED IN INTERACTIVE
- 25 COMPUTER USE.

CORRECT ANSWER RANGE

- 26 MIN: 9
- 26 MAX: 1.00000E+30

REPLY FOR THIS RANGE:

- 27 IN A SCHOOL WHERE THERE IS LIMITED COMPUTER USE, YOU SHOULDN'T
- 28 ENCOUNTER MAJOR COMPLICATIONS IN THE SCHEDULING OF INTERACTIVE
- 29 COMPUTER TIME.

CORRECT ANSWER RANGE

- 30 MIN: 0
- 30 MAX: 0

REPLY FOR THIS RANGE:

- 31 000

REPLY TO UNEXPECTED ANSWER:

- 32 TYPE A POSITIVE NUMBER, DING-DONG!

SECTION # 8

SECTION OPTIONS:

KEYWORD

TEXT:

- 1 INDIVIDUAL STUDENTS SHOULD BE ABLE TO RESERVE BLOCKS OF COMPUTER
- 2 TIME FOR THEIR OWN USE BY REGISTERING IN ADVANCE ON A CALENDAR
- 3 POSTED IN THE TERMINAL ROOM. THE CALENDAR WILL PROVIDE TEACHERS
- 4 WITH AN OVERVIEW OF STUDENT USE, AND IN TIMES OF HIGH USAGE
- 5 PRIORITY CAN BE GIVEN TO STUDENTS ON SPECIFIC PROJECTS.
- 6 PRIORITIES SHOULD BE SET MUTUALLY BY TEACHERS WHOSE STUDENTS ARE
- 7 INVOLVED IN COMPUTER USE.

QUESTION:

- 8 HAVE YOU EVER SAT DOWN WITH TEACHERS FROM ANOTHER DEPARTMENT TO
- 9 DISCUSS ACADEMIC OR CURRICULUM MATTERS?

CORRECT ANSWER GROUP

- 10 *YES*

REPLY FOR THIS GROUP:

- 11 GOOD. YOU'RE OFF TO A GOOD START. ALLOCATION OF COMPUTER
- 12 PRIORITIES CAN PROVIDE A GOOD STARTING POINT FOR AN INTER-
- 13 DEPARTMENTAL MEETING.

WRONG ANSWER GROUP:

- 14 *NO*

REPLY FOR THIS GROUP:

- 15 UNFORTUNATELY, YOUR EXPERIENCE IS A COMMON ONE. THE ALLOCATION
- 16 OF COMPUTER PRIORITIES MIGHT PROVIDE A STARTING POINT, HOWEVER,
- 17 FOR BRINGING DEPARTMENTS TOGETHER TO DEAL WITH SIGNIFICANT
- 18 ISSUES.
- 19 \$BRANCH- 9

REPLY TO UNEXPECTED ANSWER:

- 20 PLEASE TYPE YES OR NO . I DIDN'T UNDERSTAND YOU.

SECTION # 9

SECTION OPTIONS:

KEYWORD

TEXT:

- 1 WHEN TERMINAL TIME IS AT A PREMIUM ONE OF THE OBVIOUS WAYS
- 2 TO IMPROVE EFFICIENCY IS TO INCREASE USAGE DURING NON-SCHOOL
- 3 HOURS. FOR MAXIMUM EFFICIENCY THE SYSTEM SHOULD BE AVAILABLE
- 4 24 HOURS PER DAY, SEVEN DAYS PER WEEK.

QUESTION:

- 5 DO YOU ANTICIPATE THAT YOUR TERMINALS WILL BE AVAILABLE
- 6 24 HOURS PER DAY, SEVEN DAYS PER WEEK FOR STUDENT USE?

CORRECT ANSWER GROUP

- 7 *YES*

REPLY FOR THIS GROUP:

- 8 YOU ARE VERY FORTUNATE!

9 *NO*

REPLY FOR THIS GROUP:

10 THIS IS NOT AN UNUSUAL SITUATION. MANY SCHOOLS ARE CLOSED MORE
11 THAN 16 HOURS OUT OF EACH 24! BUT THERE ARE DEFINITE THINGS YOU
12 CAN DO TO STIMULATE USE IN OFF-HOURS, ON WEEKENDS, AND DURING
13 VACATIONS. THE FIRST THING TO DO IS TO SEE THAT THE SCHOOL IS
14 OPEN AND ACCESSIBLE FOR AS MANY HOURS AS POSSIBLE. (THERE IS, OF
15 COURSE, THE VERY REAL PROBLEM OF TERMINAL AND BUILDING SECURITY,
16 MALICIOUS MISCHIEF THRIVES IN UNSUPERVISED PUBLIC PLACES.)
17 ANOTHER APPROACH IS TO PLACE A 'DIAL-UP' TERMINAL IN A PUBLIC
18 LIBRARY OR EVEN IN THE POLICE STATION FOR EASY STUDENT ACCESS
19 DURING OFF-HOURS.
20 BRANCH- 10

REPLY TO UNEXPECTED ANSWER:

21 PLEASE TYPE 'YES' OR 'NO'; I DIDN'T UNDERSTAND YOUR RESPONSE.

SECTION # 10

SECTION OPTIONS:

KEYWORD

TEXT:

1 WHEN UNINITIATED STUDENTS ATTEMPT TO ACCESS COMPUTER MODULES,
2 MINOR COMPLICATIONS FREQUENTLY ENSUE. IN THEIR FIRST
3 INTERACTIVE SESSIONS, QUESTIONS REGARDING THE TERMINAL AND
4 SYSTEM INSTRUCTIONS ARE ALMOST INEVITABLE. TRAINED STUDENTS
5 CAN READILY PROVIDE THIS HELP IF THEY ARE AVAILABLE. SUCH HELP
6 CAN BE PROVIDED FORMALLY IF A STUDENT COMPUTER CLUB IS ORGANIZED
7 TO PROVIDE IT OR IF A PARAPROFESSIONAL IS HIRED TO FULFILL THAT
8 AND RELATED TASKS.

QUESTION:

9 DO YOU ANTICIPATE THAT YOUR SCHOOL WILL HIRE A PARAPROFESSIONAL
10 FOR THAT PURPOSE?

CORRECT ANSWER GROUP

11 *YES*

REPLY FOR THIS GROUP:

12 USING A PARAPROFESSIONAL TO SUPPORT THE TERMINAL AREA AND TO
13 PROVIDE PROCTOR ASSISTANCE TO STUDENTS SHOULD PROVE TO BE A
14 VALUABLE ASSET. DON'T FORGET TO INCLUDE INTERESTED STUDENTS
15 IN THIS ACTIVITY. IT WILL NOT ONLY ALLOW THEM TO CONTRIBUTE TO
16 THE SCHOOL PROGRAM, BUT IT WILL ALSO BE A VALUABLE EXPERIENCE
17 FOR THEM.

UPON ANSWER GROUP:

74

18 #NO#

REPLY FOR THIS GROUP:

- 19 THE NEED FOR PARAPROFESSIONAL SUPPORT PERHAPS OUGHT TO BE
- 20 RAISED WITH YOUR SCHOOL BOARD. HOWEVER, DON'T UNDERESTIMATE
- 21 THE ASSISTANCE THAT STUDENTS CAN PROVIDE. THE EXPERIENCE
- 22 ALLOWS THEM TO CONTRIBUTE TO THEIR SCHOOL, AND IT PROVIDES
- 23 VALUABLE LEARNING OPPORTUNITIES FOR THEM AS WELL.
- 24 11BRANCH- 11

REPLY TO UNEXPECTED ANSWER:

- 25 PLEASE TYPE 'YES' OR 'NO'; I DIDN'T UNDERSTAND.

SECTION # 11

SECTION OPTIONS:

KEYWORD

TEXT:

- 1 AS WE MOVE TOWARD MORE EXTENSIVE COMPUTER USE IN TEACHING
- 2 WE OUGHT TO REEVALUATE OUR STAFFING PATTERNS TO DETERMINE IF
- 3 THERE IS A MORE OPTIMAL ARRANGEMENT THAN THE ONE
- 4 CURRENTLY IN USE. WITH THE HELP OF AIDES AND INTERN TEACHERS
- 5 A TEACHER WHO HAS DEVELOPED AN EFFECTIVE INDIVIDUALIZED COURSE
- 6 SHOULD BE ABLE TO WORK WITH LARGER NUMBERS OF STUDENTS IN A
- 7 QUALITY INSTRUCTIONAL ENVIRONMENT. WITH A "MASTER TEACHER" IN
- 8 CHARGE OF TEACHING AND DEVELOPMENT IN A COURSE, A SCHOOL WOULD
- 9 HAVE AN EFFECTIVE VEHICLE FOR TRAINING TEACHERS AND
- 10 FOR ENCOURAGING QUALITY WITHIN AN INSTRUCTIONAL PROGRAM
- 11 DESIGNED TO PROVIDE FOR STUDENT DIFFERENCES.

QUESTION:

- 12 CAN COMPUTERS HAVE A DEHUMANIZING INFLUENCE ON A CLASSROOM
- 13 ENVIRONMENT?

CORRECT ANSWER GROUP

14 #YES#

REPLY FOR THIS GROUP:

- 15 I AGREE WITH YOU!

UPON ANSWER GROUP:

16 #NO#

REPLY FOR THIS GROUP:

75

- 17 I DISAGREE!
- 18 BRANCH- 12

REPLY TO UNEXPECTED ANSWER:

- 19 PLEASE TYPE 'YES' OR 'NO'. I DIDN'T UNDERSTAND YOU.

SECTION # 12

TEXT:

- 1 IN MY OPINION, COMPUTERS LIKE OTHER TECHNOLOGICAL DEVICES CAN BE
- 2 SERIOUSLY MISUSED BY THE CLASSROOM TEACHER -- ALTHOUGH I DON'T
- 3 BELIEVE THAT MISUSE IS INEVITABLE. IN THE HANDS OF CONCERNED,
- 4 SENSITIVE TEACHERS, I BELIEVE THAT SUCH DEVICES CAN ENHANCE
- 5 THE LEARNING PROCESS. WE SHOULD UTILIZE TECHNOLOGICAL DEVICES
- 6 TO HELP US MEET MORE EFFECTIVELY THE LEARNING GOALS OF
- 7 OUR STUDENTS. LET US BE CONCERNED AND SENSITIVE!!

QUESTION:

- 8 AS YOU MOVE TOWARD MORE EXTENSIVE USE OF THE COMPUTER AS A
- 9 RESOURCE IN YOUR CLASSROOM ENVIRONMENT, DO YOU ENVISION
- 10 PROBLEMS AND COMPLICATIONS THAT WILL BE (1) VERY MINOR,
- 11 (2) MODERATE BUT MANAGEABLE, (3) OVERWHELMING ?

CORRECT ANSWER RANGE

- 12 MIN: 1
- 12 MAX: 1

REPLY FOR THIS RANGE:

- 13 GREAT! KEEP YOUR EYES OPEN AND DEAL WITH THOSE PROBLEMS THAT
- 14 DO ARISE.

CORRECT ANSWER RANGE

- 15 MIN: 2
- 15 MAX: 2

REPLY FOR THIS RANGE:

- 16 GOOD! KEEP YOUR EYES OPEN AND DEAL WITH THOSE PROBLEMS THAT
- 17 DO ARISE.

CORRECT ANSWER RANGE

- 18 MIN: 3
- 18 MAX: 3

REPLY FOR THIS RANGE:

- 19 IN CASE YOU HAVEN'T GUESSED, I DON'T SHARE YOUR
- 20 DEFENSIVENESS. IF WE KEEP OUR EYES OPEN, I BELIEVE WE CAN DEAL
- 21 EFFECTIVELY WITH MOST OF THE PROBLEMS THAT DO ARISE.

REPLY TO UNEXPECTED ANSWER:

- 22 PLEASE TYPE 1,2, OR 3.

SECTION # 13

TEXT:

1 BEST WISHES! SO LONG FOR NOW!!

SECTION NUMBER?
DONE

Computer Dialog for Children?

"The computer is a versatile tool that will play a major role in tomorrow's classroom."

"The computer is just another passing fad in education, another technological gimmick!"

Just what is a classroom computer anyway?

Computers are devices that store information and perform logical operations on that information at very high speed. Students today can interact with computers through typewriter terminals and through video terminals in their schools. More expensive video systems allow children to respond to questions and diagrams with a pointer called a light pen. With today's technology a large computer may be many miles from the classrooms it supports, but a growing trend is to place a minicomputer in the local school.

Teachers do not have to know a lot about computers to use them effectively in support of classroom instruction. The computer is much less intelligent than the human teacher and needs explicit instructions on anything it is to do. Teachers can provide these instructions with help from new computer programs written especially for their use and with a little support from a computer specialist.

Can the computer facilitate learning for students in elementary and middle school classrooms? What aspects of the curriculum can be handled effectively by computers today?

Perhaps the most basic computer application for younger children is DRILL AND PRACTICE. Well written drill and practice exercises are available commercially; they can be fun and provide immediate reinforcement to

children while they practice basic skills. For example, a child practicing multiplication facts might receive the prompt 7 X 9 = on a video screen. If he responds by typing 63, the computer may then display GREAT!! followed by the presentation of another problem. Were the child to have responded to the original prompt by typing 34 instead of the correct answer, he might have received the message: NO, TRY AGAIN. In contemporary teacher-author programs such as Hewlett Packard's Interactive Dialog Facility (IDF), the author can specify for each prompt or question the number of times a student may make an incorrect response before being given help or the correct answer. Normally drill and practice exercises are timed. The author can specify the maximum amount of time an individual student may have for each response.

Each student's scores can be filed by the computer for use in branching him to instructional materials appropriate for his own needs and for future reference by his teacher. Student responses can also be stored in a statistical file for use by the author when evaluating and revising the program.

While most drill and practice exercises used in schools today are in the field of arithmetic, a number of other curriculum areas could well use the technique. Vocabulary drills, classification tasks, and foreign language translation, for example, are particularly amenable to drill and practice techniques. Here is a short sample from a drill and practice exercise in which the video screen displays a French word or phrase and the student types the English equivalent. (Student responses are shown here in lower case.)

VIN BLANC water

COME ON NOW; WHAT DO FRENCHMEN LIKE TO DRINK?

wine

OUI. VIN BLANC MEANS WHITE WINE.

When a student responds incorrectly to a certain class of prompts, the computer can branch him to easier items, provide help, or repeat the items with which he has had difficulty if the author of the module builds such branching into the instructional program.

One of the nicest computer applications in learning is the SIMULATION of real world events. In a simulation the student manipulates variables and observes effects on the system under study. For example, good simulations have been written in which students observe the effects of various birth rates, death rates, and migration rates upon population size in future years. In other simulations students observe the long term effects of pollutants. When a subject is worthy of study but impossible to bring into the classroom because it is too dangerous, complex, or expensive, that subject is a likely candidate for instructional simulation.

The appropriateness of computer simulations for elementary school children, however, must be carefully scrutinized. The value of simulation techniques may well be limited since their use demands a level of abstraction that is frequently beyond the stage of logical development of younger children.

A computer application that does hold great contemporary potential for elementary school children can be called TUTORIAL DIALOG. Although good tutorial programs take a lot of time to write and are in short supply today,

modern computers certainly have the capacity to handle programs like this sample tutorial dialog in English useage. (Again, student responses are shown in lower case.)

O.K. SUSAN, NOW READ THE FOLLOWING SENTENCE FROM YOUR FRIENDLY COMPUTER: I THINK I AM A BOY.

HOW MANY VERBS ARE IN THAT SENTENCE? three

NO. YOU'D BETTER LOOK AGAIN. two

FINE!

WHAT IS THE TENSE OF THOSE VERBS? past

COME ON NOW. THESE VERBS SHOW ACTION NOW. TRY ANOTHER TENSE.
future

THESE VERBS DON'T DESCRIBE ACTION THAT IS GOING TO HAPPEN.
THE ACTION IS NOW. TRY ANOTHER TENSE.
present

CERTAINLY!

TYPE A SENTENCE USING ONE OF THE TWO VERBS.

I like to think.

O.K. SUSAN, I'LL ACCEPT THAT.

Contemporary computers are limited in their capacity to recognize and provide appropriate messages to the wide range of possible student responses. In spite of very real assets, there are limitations in the computer's ability to deal with individual student problems in tutorial dialog. Furthermore, if the author of the tutorial program happens to provide incorrect or misleading information, the tutorial program will pass that along to students. A program can, of course, be reviewed and improved with time, so shortcomings of this kind should be eliminated.

Tutorial dialog can be used to enhance the understanding of graphed relationships. Students can be asked to interpret graphed data and to make predictions in response to questions posed in the computer dialog. The computer can evaluate the accuracy of their responses and provide individual students with appropriate messages.

Perhaps the most widespread computer application in public schools is instructional GAMING. A wide array of game programs are available in which student users pit themselves against the computer. David Ahl's 101 BASIC Computer Games available from Digital Equipment Corporation, for example, provides listings of games that run a gamut from Tic-Tac-Toe to Checkers and from Guess the Mystery Number to Blackjack. There is little doubt that computer games can be highly motivational and that players can develop logical skills through playing some of them. There is reason to question the value of the investment, however, when games interspersed with computer generated pictures of SNOOPY are the predominant computer activity, as is the case in some schools.

Computers, like other technological devices, can be seriously misused, and the dehumanizing influence of machines in human learning does need careful consideration. Yet dehumanization and misuse of the computer are not inevitable in a classroom. In the hands of concerned, sensitive teachers computers have been shown to enhance learning. In recent years many teachers have come to recognize that individual children learn best at different rates and in their own unique ways. Learners vary in experience, in ability, and in motivation; they differ in the length of time they need to master specific concepts. Perceptive teachers have been able to develop teaching strategies that foster individualized learning. With care,

the computer can be employed as an effective tool providing individualized supplements to classroom instruction.

As a result of encounters with computers some students will want to learn more about them, and they should be encouraged to pursue that interest. Older students can learn a symbolic programming language and use that language to solve realistic problems and to write their own programs. As a byproduct of computer use in education, students are likely to develop a perception of the potential and limitations of general computer applications that will be of value later in their lives.

Acquisition and Use
of
Materials

Computer Programs. The author authorizes non-commercial use of the programs included in this Report without his approval. A magnetic tape of the computer programs and files may be obtained for a total cost of \$25.00 including all mailing and handling charges. The tape may be obtained by writing:

Librarian
Computer Center
Lindquist Center for Measurement
University of Iowa
Iowa City, Iowa 52242

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